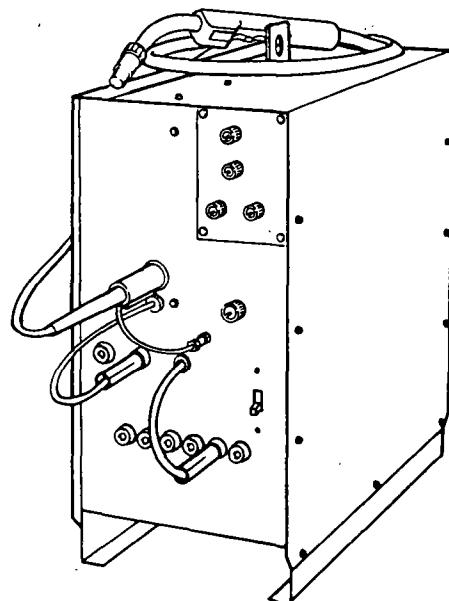


Effective With Serial No. JH159463

IMPORTANT: Read and understand the entire contents of this manual, with special emphasis on the safety material throughout the manual, before installing, operating, or maintaining this equipment. This unit and these instructions are for use only by persons trained and experienced in the safe operation of welding equipment. Do not allow untrained persons to install, operate, or maintain this unit. Contact your distributor if you do not fully understand these instructions.

MODEL
AUTO ARC MW 4150
SPW 1



OWNER'S MANUAL

AUTO ARC

MILLER ELECTRIC MFG. CO.

718 S. BOUNDS ST, P.O. Box 1079
APPLETON, WI 54912 USA

NWSA CODE NO. 4579
PRINTED IN U.S.A.

ONE YEAR LIMITED WARRANTY

COVERAGE - Miller Electric Mfg. Co. warrants to the buyer who purchases this Auto Arc Welder ("Welder") for personal, family or household purposes ("Consumer") that this Welder will be free from defects in material and workmanship for a period of one year from the date of purchase. This warranty covers only the original purchaser of this Welder. Miller Electric does not authorize any party, including its authorized distributors, to offer any other warranty on behalf of Miller Electric. Upon expiration of the warranty period, Miller Electric shall have no further liability related to the Welder, except on warranty claims made during the warranty period.

THIS WARRANTY IS OFFERED IN LIEU OF ANY OTHER EXPRESS WARRANTY; AND, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THE DURATION OF ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IS LIMITED TO THE DURATION OF THIS WARRANTY.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Except as specified below, Miller's warranty does not apply to components having normal useful life of less than one (1) year, such as spot welder tips, relay and contactor points, parts that come in contact with the welding wire including nozzles and nozzle insulators where failure does not result from defect in workmanship or material.

Miller shall be required to honor warranty claims on warranted Equipment in the event of failure resulting from a defect within the following periods from the date of delivery of Equipment to the original user:

1. Arc welders, power sources, and components 1 year
2. Original main power rectifiers 3 years
(labor - 1 year only)
3. All welding guns, feeder/guns and plasma torches . . . 90 days
4. Replacement or repair parts, exclusive of labor . . . 60 days

WHAT IS NOT COVERED - This warranty does not extend to any Welder subjected to misuse, neglect, accident, or in-warranty repair by anyone except Miller Electric. Further, this warranty only extends to those purchasing the Welder for personal, family or household purposes. Commercial and industrial users are given a different warranty.

REMEDY FOR DEFECTIVE WELDER - Upon receipt of any defective Welder, Miller Electric will, at its option, repair or replace the defective Welder at its expense, refund or credit the purchase price (less reasonable depreciation based on actual use), or reimburse the Consumer for the cost of repair or replacement at an approved Miller Electric warranty station, provided that the purchaser of that Welder has followed the procedure for obtaining warranty performance set forth below. The Welder so repaired or used as a replacement will be shipped to the purchaser of the defective Welder, with transportation charges prepaid to any destination in the continental United States (transportation charges on shipments to Alaska or Hawaii will be paid only to the nearest port of export).

THE PURCHASER'S REMEDIES FOR A DEFECTIVE WELDER, TO THE EXTENT PERMITTED BY APPLICABLE LAW, ARE LIMITED TO THE REMEDY PROVIDED BY THIS WARRANTY: AND, TO THE EXTENT ENFORCEABLE UNDER APPLICABLE LAW, MILLER ELECTRIC SHALL IN NO EVENT BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, THE WELDER, WHETHER BASED ON BREACH OF THIS WARRANTY, MILLER ELECTRIC'S NEGLIGENCE OR OTHER TORT, OR ON ANY THEORY OF STRICT LIABILITY.

Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above limitations may not apply to you.

PROCEDURE FOR OBTAINING WARRANTY PERFORMANCE

As soon as any defect in a Welder becomes known, the purchaser of the Welder must, within thirty (30) days, notify an approved Warranty Station or Miller Electric in writing of the defect. The purchaser must then, within the one year warranty period, return the Welder to Miller Electric at the following address:

Miller Electric Mfg. Co.
718 South Bounds Street
P.O. Box 1079
Appleton, Wisconsin 54912

All transportation charges to Warranty Station or Miller Electric must be prepaid.

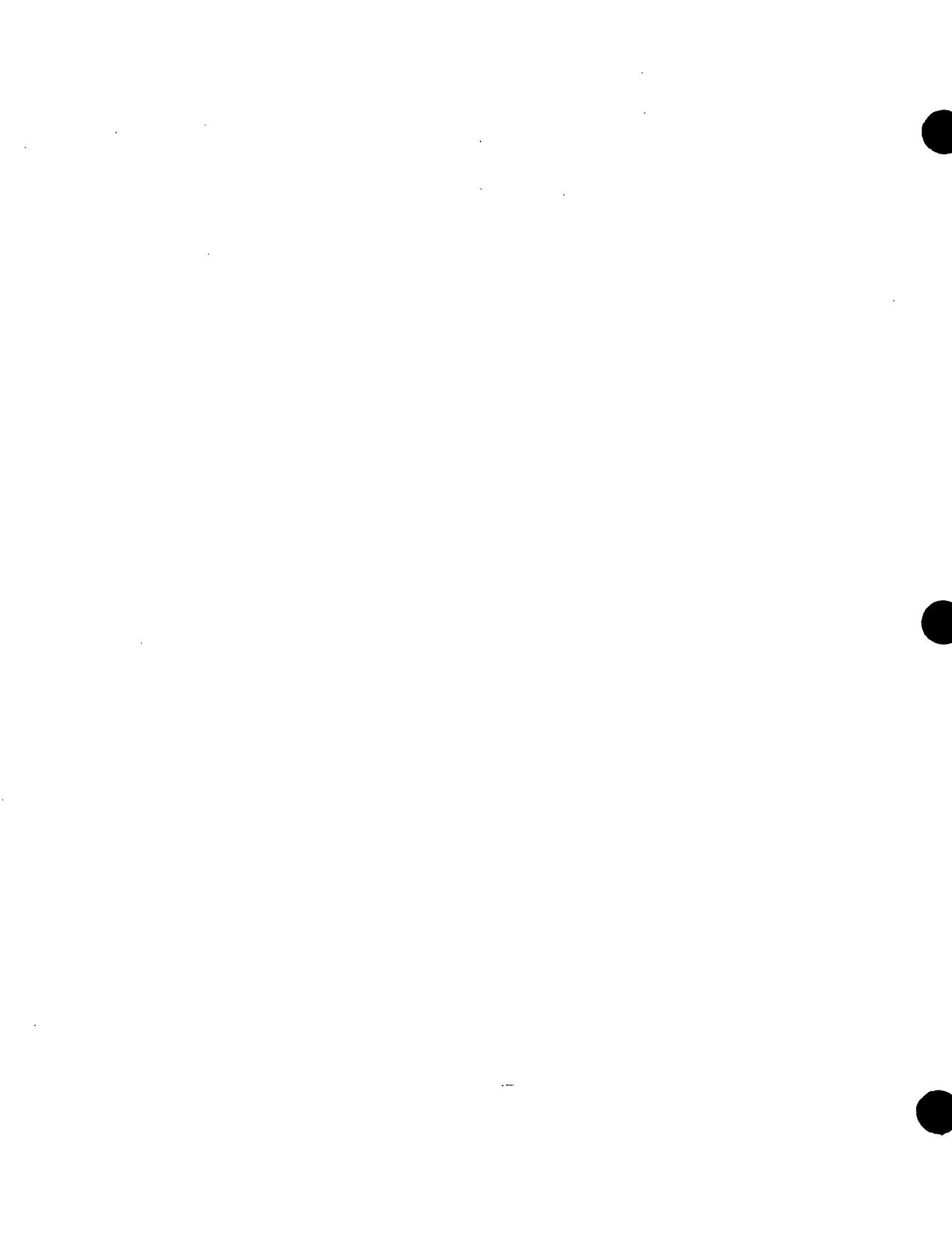
After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

**	Part No.	Replaced With	Description	Quantity
8-33	023 083	600 318	CABLE, weld-stranded No. 3 (order by ft)(Eff w/JJ337881).....	3ft
		113 280	HOSE, air (Eff w/JH296877)(consisting of).....	1
		.089 120	. CLAMP, hose 3/8 - .450 dia.....	2
		113 129	. TUBING, 1/4 ID x 1/16 (order by ft).....	4ft
		112 863	. FITTING, adapter.....	1

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

TABLE OF CONTENTS

Section No.	Page No.
SECTION 1 - SAFETY RULES FOR OPERATION OF ARC WELDING POWER SOURCE	
1 - 1. Introduction	1
1 - 2. General Precautions	1
1 - 3. Arc Welding	7
1 - 4. Standards Booklet Index	11
SECTION 2 - INTRODUCTION	
2 - 1. General Information And Safety	13
2 - 2. Receiving-Handling	13
2 - 3. Description	13
2 - 4. Duty Cycle	13
2 - 5. Volt-Ampere Curves	14
2 - 6. Description Of Supplied Parts	14
2 - 7. Additional Supplies Required	14
SECTION 3 - INSTALLATION	
3 - 1. Installation Of The Welding Power Source On Running Gear	16
3 - 2. Location	17
3 - 3. Electrical Input Connections	17
3 - 4. Installation Of The Spot Weld Panel	18
3 - 5. Work Cable Assembly	19
3 - 6. Installation Of Welding Wire Spool	20
3 - 7. Threading The Welding Wire	20
3 - 8. MWG 200 Welding Gun Connections	21
3 - 9. Installation Of Shielding Gas	22
SECTION 4 - OPERATOR CONTROLS	
4 - 1. Power Switch	23
4 - 2. Pilot Light	23
4 - 3. Thickness/Volts Selector	23
4 - 4. Fine Tuning/Wire Speed Control	23
4 - 5. Optional Spot Pulse Panel Controls	23
4 - 6. Fan-On-Demand	24
SECTION 5 - MAINTENANCE & TROUBLESHOOTING	
5 - 1. Transformer	24
5 - 2. Fan Motor	25
5 - 3. Removal Of Drive Roll Gears	25
5 - 4. Cleaning Of Drive Rolls	25
5 - 5. Circuit Breakers	25
5 - 6. Troubleshooting	25
SECTION 6 - WELDING PARAMETERS, TECHNIQUES AND SET-UP	
6 - 1. Continuous Seam Gas Metal Arc Welding	30
6 - 2. Set-Up For Continuous Gas Metal-Arc Welding	31
6 - 3. Pulsed Gas Metal Arc Welding	32
6 - 4. Spot Welding	33
6 - 5. Plug Welds	33
6 - 6. Skip Welding	33
6 - 7. Weld Defects: Causes And Corrective Actions	33
6 - 8. Procedures For Welding	36
6 - 9. Procedures For Welding Door Panels	36
6 - 10. Procedures For Welding Fenders And Quarter Panels	37
6 - 11. Welding Frames And High Strength (HSS) Steels	37
6 - 12. Procedures For Welding Thin Sheet Metal	38
6 - 13. Welding Mild Steels	38
6 - 14. How To Prevent Glass Breakage And Spatter On Windows	38
6 - 15. Shutdown Procedures	38



SECTION 1 - SAFETY RULES FOR OPERATION OF ARC WELDING POWER SOURCE

SECTION 1 - RÈGLES DE SÉCURITÉ POUR LE FONCTIONNEMENT DU POSTE DE SOUDAGE À L'ARC

1-1. INTRODUCTION - We learn by experience. Learning safety through personal experience, like a child touching a hot stove is harmful, wasteful, and unwise. Let the experience of others teach you.

Safe practices developed from experience in the use of welding and cutting are described in this manual. Research, development, and field experience have evolved reliable equipment and safe installation, operation, and servicing practices. Accidents occur when equipment is improperly used or maintained. The reason for the safe practices may not always be given. Some are based on common sense, others may require technical volumes to explain. It is wiser to follow the rules.

Read and understand these safe practices before attempting to install, operate, or service the equipment. Comply with these procedures as applicable to the particular equipment used and their instruction manuals, for personal safety and for the safety of others.

Failure to observe these safe practices may cause serious injury or death. When safety becomes a habit, the equipment can be used with confidence.

These safe practices are divided into two Sections: 1 - General Precautions, common to arc welding and cutting; and 2 - Arc Welding (and Cutting) (only).

Reference standards: Published Standards on safety are also available for additional and more complete procedures than those given in this manual. They are listed in the Standards Index in this manual. ANSI Z49.1 is the most complete.

The National Electrical Code, Occupational Safety and Health Administration, local industrial codes, and local inspection requirements also provide a basis for equipment installation, use, and service.

1-2. GENERAL PRECAUTIONS

Different arc welding processes, electrode alloys, and fluxes can produce different fumes, gases, and radiation levels. In addition to the information in this manual, be sure to consult flux and electrode manufacturers for specific technical data and precautionary measures concerning their material.

A. Burn Prevention

Wear protective clothing - gauntlet gloves designed for use in welding, hat, and high safety-toe shoes. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a **MUST** for welding or cutting, (and chipping) to protect the eyes

1-1. INTRODUCTION - Contrairement à l'apprentissage de la vie, l'apprentissage de la sécurité par expérience personnelle, comme l'enfant qui touche un poêle chaud, est dangereux, imprudent et inutile. Instruisez-vous donc de l'expérience d'autrui.

Des méthodes de sécurité issues de l'expérience du soudage et du coupage sont décrites dans le manuel. La recherche, le progrès et l'expérience dans ce domaine ont développé un matériel fiable et des méthodes de sécurité pour l'installation, le fonctionnement et l'entretien. Des accidents se produisent lorsque le matériel est inadéquatement utilisé ou entretenu. La raison de ces méthodes de sécurité peut ne pas être toujours donnée. Certaines sont fondées sur le sens commun, d'autres demanderont à être expliquées par des livres techniques. Il est plus sage de suivre les règles.

Lisez et comprenez ces méthodes de sécurité avant d'essayer d'installer, de faire fonctionner ou de réparer l'appareil. Pour votre sécurité personnelle et celle d'autrui, conformez-vous à ces règles et aux manuels d'instructions.

Manquer d'observer ces méthodes de sécurité pourrait entraîner des blessures graves ou même la mort. Quand la sécurité devient une habitude, le matériel peut alors être utilisé en toute confiance.

Ces méthodes de sécurité sont divisées en deux sections: 1 - Précautions générales, communes au soudage et au coupage à l'arc, et 2 - Soudage à l'arc (et coupage) (uniquement).

Normes de référence: Des publications des normes américaines de sécurité sont aussi à votre disposition pour d'autres modes opératoires plus complets que ceux du présent manuel. Elles sont données dans l'Index des Normes de ces règles de sécurité. ANSI Z49-1 est la plus complète.

Les codes de l'ACNOR, les codes provinciaux et municipaux donnent aussi les exigences pour une installation, une utilisation et un entretien sûrs.

1-2. PRÉCAUTIONS GÉNÉRALES

Plusieurs procédés du soudage à l'arc, des électrodes alliés, et les flux peuvent produire des vapeurs, gaz, et niveaux de rayonnement différents. Pour tout renseignement supplémentaire à ce manuel, consultez aussi les fabricants des électrodes et des flux afin d'obtenir les renseignements techniques spécifiques et les mesures de précaution concernant leurs matériaux.

A. Prévention des brûlures

Portez des vêtements de protection - des gants à crispin spécialement désignés pour le soudage, un casque et des chaussures de sécurité. Boutonnez le col de votre chemise et les pattes de vos poches, et portez des pantalons sans revers pour éviter que des étincelles et du laitier ne s'y introduisent.

Portez un masque avec lunettes de sécurité ou avec écrans latéraux de protection, des lunettes filtrantes ou des couvre-lentilles (protégés par un verre clair). Pour le soudage ou le coupage (et le burinage), il est

from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered. See 1-3A.2.

Avoid oily or greasy clothing. A spark may ignite them.

Hot metal such as electrode stubs and workpieces should never be handled without gloves.

Medical first aid and eye treatment. First aid facilities and a qualified first aid person should be available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns.

Ear plugs should be worn when working on overhead or in a confined space. A hard hat should be worn when others work overhead.

Flammable hair preparations should not be used by persons intending to weld or cut.

B. Toxic Fume Prevention

Severe discomfort, illness or death can result from fumes, vapors, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation as described in ANSI Standard Z49.1 listed 1 in Standards index. NEVER ventilate with oxygen.

Lead -, cadmium -, zinc -, mercury -, and beryllium-bearing and similar materials, when welded (or cut) may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air-supplied respirator. For beryllium, both must be used.

Metals coated with or containing materials that emit toxic fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing an air-supplied respirator.

Gas leaks in a confined space should be avoided. Leaked gas in large quantities can change oxygen concentration dangerously. Do not bring gas cylinders into a confined space.

Leaving confined space, shut OFF gas supply at source to prevent possible accumulation of gases in the space if downstream valves have been accidentally opened or left open. Check to be sure that the space is safe before re-entering it.

Vapors from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and other lung and eye irritating products. The ultraviolet (radian) energy of the arc can also decompose trichloroethylene and perchloroethylene vapors to form phosgene. DO NOT WELD or cut where solvent vapors can be drawn into the welding or cutting atmosphere or where the radiant

OBLIGATOIRE de protéger ses yeux contre l'énergie de rayonnement et les éclats de métal. Remplacez le verre protecteur lorsqu'il est brisé, piqué ou qu'il a reçu des projections. Voir 1.3A.2.

Évitez de porter des habits imprégnés d'huile ou de graisse. Une étincelle pourrait les enflammer.

Ne manipulez jamais sans gants un métal chaud tel que des chutes d'électrode et des pièces à souder.

Premiers soins et traitement des yeux: Tout atelier devrait avoir à sa disposition un poste de premiers soins ainsi qu'une personne compétente, à moins qu'ur, service médical ne soit à proximité pour soigner immédiatement les brûlures des yeux et de la peau.

Portez des bouche-oreilles lorsque vous travaillez au plafond ou dans un espace restreint. Portez un casque lorsque d'autres personnes travaillent au plafond.

Les personnes devant souder ou couper ne doivent pas employer des préparations inflammables pour leurs cheveux.

B. Prévention des gax toxiques

Les gaz, les vapeurs, la chaleur, un enrichissement ou un manque d'oxygène peuvent entraîner un malaise, une maladie ou même la mort. Remédiez-y par la ventilation décrite dans la Norme ANSI Z49.1 paragraphe 1 de l'Index des Normes. NE ventilez JAMAIS à l'oxygène.

En soudant ou en coupant, les plomb, cadmium, zinc, mercure et beryllium ou autres matériaux semblables peuvent créer des concentrations nocives de gaz toxiques. On doit avoir recours à une ventilation aspirante adéquate du local, ou alors toute personne sur les lieux, de même que le soudeur, doit porter un masque à adduction d'air. On doit employer les deux pour le beryllium.

Les métaux enrobés ou composés de matériaux émettant des gaz toxiques ne doivent pas être chauffés à moins que l'enrobage ne soit ôté de la surface à travailler, que le local ne soit bien ventilé, ou que le soudeur ne porte un masque à adduction d'air.

Ne travaillez dans un espace restreint que s'il est bien ventilé et, si nécessaire, portez un masque à adduction d'air.

On doit éviter les fuites de gaz dans un espace restreint. Les fuites de gaz en grande quantité peuvent transformer dangereusement la concentration d'oxygène. N'amenez pas de bouteilles de gaz dans un espace restreint.

En quittant un espace restreint, FERMEZ le robinet d'alimentation de gaz de la bouteille. Ainsi on pourra rentrer en toute sécurité dans la pièce, même si les robinets "aval" ont été ouverts par accident, ou si on les a laissés ouverts.

Les vapeurs de dissolvants chlorés peuvent être décomposées par la chaleur de l'arc (ou de la flamme) et former du PHOSGÈNE, gaz très toxique, et d'autres produits irritant les poumons et les yeux. L'énergie ultra-violette de l'arc peut aussi décomposer les vapeurs de trichloroéthylène et de perchloroéthylène pour former du phosgene. NE SOUDEZ PAS ou ne coupez pas dans des endroits où les vapeurs de dissolvants peuvent être attirées dans l'atmosphère de soudage ou de

energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C. Fire and Explosion Prevention

Causes of fire and explosion are: combustibles reached by the arc, flame, flying sparks, hot slag or heated material; misuse of compressed gases and cylinders; and short circuits.

BE AWARE THAT flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggled operator. Sparks and slag can fly 35 feet.

To prevent fires and explosion:

Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are in area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move combustibles at least 35 feet away out of reach of sparks and heat; or protect against ignition with suitable and snug-fitting, fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on (or cut). Walls, ceilings, and floor near work should be protected by heat-resistant covers or shields.

Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if:

- a. appreciable combustibles (including building construction) are within 35 feet
- b. appreciable combustibles are further than 35 feet but can be ignited by sparks
- c. openings (concealed or visible) in floors or walls within 35 feet may expose combustibles to sparks
- d. combustibles adjacent to walls, ceilings, roofs, or metal partitions can be ignited by radiant or conducted heat.

Hot work permit should be obtained before operation to ensure supervisor's approval that adequate precautions have been taken.

After work is done, check that area is free of sparks, glowing embers, and flames.

An empty container that held combustibles, or that can produce flammable or toxic vapors when heated, must never be welded on or cut, unless container has first been cleaned as described in AWS Standard A6.0, listed 7 in Standards index.

This includes: a thorough steam or caustic cleaning (or a solvent or water washing, depending on the com-

coupage et où l'énergie de rayonnement peut pénétrer dans des atmosphères contenant des quantités même minuscules de trichloroéthylène ou de perchloroéthylène.

C. Prévention des incendies et des explosions

Les causes d'incendie et d'explosion sont les combustibles atteints par l'arc, la flamme, les étincelles, le laitier chaud ou les matériaux chauffés, le mauvais emploi des gaz comprimés et des bouteilles ainsi que les courts-circuits.

Sachez que les éclats d'étincelles ou la chute du laitier peuvent s'infiltrer dans les fissures, le long des tuyauteries, par les fenêtres et les portes et par les couvertures des murs ou du sol, sans que le soudeur portant des lunettes ne les voie. Les étincelles et les scories peuvent voler jusqu'à 35 pieds.

Pour prévenir les incendies et les explosions: Veillez à ce que votre appareil soit propre et en état de marche, dénué d'huile et de graisse, et de particules de métal sur les pièces électriques qui pourraient entraîner des courts-circuits.

Si des combustibles se trouvent à proximité, ne soudez pas, ne coupez pas. Si possible, déplacez votre travail loin des combustibles. Évitez les ateliers de peinture au pistolet, les cuves d'immersion, les entrepôts, les ventilateurs. Si cela n'est pas possible, placez les combustibles à au moins 35 pieds des étincelles et de la chaleur et protégez-les des étincelles avec des couvertures ou des écrans protecteurs adéquats, bien ajustés et ignifugés.

On ne doit pas souder (ou couper) le côté opposé des murs touchant les combustibles. Les murs, plafonds et planchers proches du travail doivent être protégés par des couvertures ou écrans protecteurs ignifugés.

Un surveillant doit se tenir à proximité avec un matériel de lutte contre l'incendie adéquat, pendant et quelque temps après le soudage ou le coupage si:

- a. Des quantités appréciables de combustibles (y compris une construction en chantier) se trouvent à moins de 35 pieds.
- b. Des quantités appréciables de combustibles sont à plus de 35 pieds mais peuvent être enflammées par des étincelles.
- c. Des ouvertures (cachées ou visibles) sur les planchers ou les murs à moins de 35 pieds peuvent exposer des combustibles aux étincelles.
- d. Les combustibles adjacents aux murs, plafonds, toits ou cloisons métalliques peuvent être enflammés par une chaleur rayonnante ou transmise.

Avant de commencer, avisez le contremaître pour qu'il s'assure que les précautions adéquates soient prises.

Une fois le travail terminé, vérifiez qu'il n'y ait pas d'étincelles, de cendres ardentes ou de flammes dans le local.

On ne doit jamais souder ni couper sur un récipient ayant contenu des combustibles, ou pouvant produire des vapeurs inflammables ou toxiques à la chauffe, à moins que le récipient n'ait été lavé au préalable, comme décrit dans la Norme AWS A6.0, figurant au paragraphe 7 de l'Index des Normes.

Cela comprend: un nettoyage à fond à la vapeur ou au caustique (ou un lavage avec dissolvant ou eau selon la solubilité du combustible) suivi d'une purge et d'une in-

bustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment as recommended in A6.0. Waterfilling just below working level may substitute for inerting.

A container with unknown contents should be cleaned (see paragraph above). Do NOT depend on sense of smell or sight to determine if it is safe to weld or cut.

Hollow castings or containers must be vented before welding or cutting. They can explode.

Explosive atmospheres. Never weld or cut where the air may contain flammable dust, gas, or liquid vapors (such as gasoline).

D. Compressed Gas Equipment

Standard precautions. Comply with precautions in this manual, and those detailed in CGA Standard P-1, **SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS**, listed 11 in Standards index.

1. Pressure Regulators

Regulator relief valve is designed to protect only the regulator from overpressure; it is not intended to protect any downstream equipment. Provide such protection with one or more relief devices.

Never connect a regulator to a cylinder containing gas other than that for which the regulator was designed.

Remove faulty regulator from service immediately for repair (first close cylinder valve). The following symptoms indicate a faulty regulator:

Leaks - if gas leaks externally.

Excessive Creep - if delivery pressure continues to rise with downstream valve closed.

Faulty Gauge - if gauge pointer does not move off stop pin when pressurized, nor returns to stop pin after pressure release.

Repair. Do NOT attempt repair. Send faulty regulators for repair to manufacturer's designated repair center, where special techniques and tools are used by trained personnel.

2. Cylinders

Cylinders must be handled carefully to prevent leaks and damage to their walls, valves, or safety devices:

Avoid electrical circuit contact with cylinders including third rails, electrical wires, or welding circuits. They can produce short circuit arcs that may lead to a serious accident. (See 1-3C.)

ICC or DOT marking must be on each cylinder. It is an assurance of safety when the cylinder is properly handled.

jection d'azote ou de gaz carbonique, en utilisant un équipement de protection comme recommandé dans l'A6-0. L'atmosphère inerte peut être remplacée par un niveau d'eau arrivant au-dessous du travail à effectuer.

Vous devez laver un récipient dont la nature de contenu est inconnue (voir paragraphe ci-dessus). NE vous fiez PAS à l'odorat ou à la vue pour dire si l'on peut le souder ou le couper en toute sécurité.

Vous devez pratiquer un évent sur les pièces ou récipients creux avant de les souder ou couper: ils peuvent exploser.

Atmosphères explosives: Ne soudez ni ne coupez jamais dans des lieux où l'air peut contenir des poussières, gaz ou vapeurs liquides inflammables (tels que l'essence).

D. Gaz comprimé

Précautions générales: Suivez les précautions de ce manuel, et celles décrites à la Norme CGA P-1 (Précautions de sécurité pour la manipulation de gaz comprimés en bouteilles), paragraphe 6 de l'Index des Normes.

1. Détendeurs de pression

La soupape de sûreté d'un détendeur est destinée à protéger seulement le détendeur de la surpression. Elle n'a pas pour but de protéger les tuyaux et le chalumeau: on protège ceux-ci par des soupapes de retenue conçues spécialement pour cette fonction.

Ne montez jamais un détendeur sur une bouteille contenant un gaz différent de celui pour lequel le détendeur a été conçu.

Enlevez immédiatement un détendeur défectueux pour le faire réparer (d'abord, fermez le robinet de la bouteille). Les symptômes suivants dénotent la défectuosité du détendeur:

Fuites - si le gaz fuit extérieurement.

Ascension excessive - si la pression de débit continue à monter, le robinet du chalumeau étant fermé.

Manomètre défectueux - si l'aiguille du manomètre ne s'écarte pas de la goupille de butée lors de la mise en pression, ou ne revient pas sur la goupille après l'échappement de la pression.

Réparation. N'ESSAYEZ PAS de réparer vous-même. Envoyez les détendeurs défectueux à réparer aux ateliers de réparation agréés du fabricant, où des techniques et des outils spéciaux sont utilisés par un personnel formé.

2. Bouteilles

Les bouteilles doivent être manipulées avec soin pour prévenir les fuites ou dégâts à leurs parois, robinets ou systèmes de sûreté. Évitez qu'un circuit électrique soit en contact avec les bouteilles, y compris les rails de contact, les fils électriques ou les circuits de soudage. Cela pourrait créer des arcs courts-circuits pouvant entraîner des accidents graves (Voir 1.3C.).

Chaque bouteille doit porter les inscriptions ICC ou DOT. C'est un gage de sécurité pourvu que la bouteille soit bien manipulée.

Identifying gas content. Use only cylinders with name of gas marked on them; do not rely on color to identify gas content. Notify supplier if unmarked. NEVER DEFACE or alter name, number, or other markings on a cylinder. It is illegal and hazardous.

Empties: Keep valves closed, replace caps securely; mark MT; keep them separate from FULLS and return promptly.

Prohibited use. Never use a cylinder or its contents for other than its intended use, NEVER as a support or roller.

Locate or secure cylinders so they cannot be knocked over.

Passageways and work areas. Keep cylinders clear of areas where they may be struck.

Transporting cylinders. With a crane, use a secure support such as a platform or cradle. Do NOT lift cylinders off the ground by their valves or caps, or by chains, slings, or magnets.

Do NOT expose cylinders to excessive heat, sparks, slag, and flame, etc. that may cause rupture. Do not allow contents to exceed 130°F. Cool with water spray where such exposure exists.

Protect cylinders particularly valves from bumps, falls, falling objects, and weather. Replace caps securely when moving cylinders.

Stuck valve. Do NOT use a hammer or wrench to open a cylinder valve that can not be opened by hand. Notify your supplier.

Mixing gases. Never try to mix any gases in a cylinder.

Never refill any cylinder.

Cylinder fittings should never be modified or exchanged.

3. Hose

Prohibited use. Never use hose other than that designed for the specified gas. A general hose identification rule is: red for fuel gas, green for oxygen, and black for inert gases.

Use ferrules or clamps designed for the hose (not ordinary wire or other substitute) as a binding to connect hoses to fittings.

No copper tubing splices. Use only standard brass fittings to splice hose.

Avoid long runs to prevent kinks and abuse. Suspend hose off ground to keep it from being run over, stepped on, or otherwise damaged.

Coil excess hose to prevent kinks and tangles.

Protect hose from damage by sharp edges, and by sparks, slag, and open flame.

Examine hose regularly for leaks, wear, and loose connections. Immerse pressurized hose in water; bubbles indicate leaks.

Identification du gaz: N'utilisez que les bouteilles indiquant la nature du gaz; ne vous fiez pas à la couleur pour reconnaître la nature du gaz. Adressez-vous à votre fournisseur si cela n'est pas indiqué.

N'EFFACEZ ou ne modifiez JAMAIS les noms, numéros ou autres indications sur une bouteille. Cela est illégal et dangereux.

Vides: Maintenez les robinets fermés, replacez bien les chapeaux; inscrivez "Vides"; séparez-les des "Pleines" et retournez-les rapidement.

Emploi interdit: N'utilisez une bouteille ou son contenu que pour ce à quoi elle est destinée, mais JAMAIS comme support ou rouleau.

Placez les bouteilles pour qu'elles ne tombent pas. Lorsqu'un détendeur (et un boyau) est monté sur elles, placez les ou attachez-les debout.

Passages et lieux de travail. Enlevez les bouteilles d'un endroit où l'on pourrait les frapper.

Transport des bouteilles. Avec une grue, utilisez un support fiable tel qu'une plate-forme ou un cadre. NE SOULEVEZ PAS des bouteilles du sol par leur robinet ou chapeau, ou avec des chaînes, élingues ou aimants.

N'EXPOSEZ PAS les bouteilles à une chaleur excessive, aux étincelles, au laitier et aux flammes, etc., pouvant causer leur rupture. Le contenu ne doit jamais dépasser 55°C. Refroidissez en pulvérisant de l'eau si nécessaire.

Protégez les bouteilles et particulièrement les soupapes contre les chocs, les chutes, les chutes d'objets et la température. Remettez bien les chapeaux lorsque vous déplacez les bouteilles.

Robinet coincé. N'UTILISEZ PAS un marteau ou une clé métallique pour ouvrir un robinet de bouteille que l'on ne peut pas ouvrir à la main. Avisez votre fournisseur.

Mélange de gaz. N'essayez jamais de mélanger des gaz dans une bouteille.

Ne rechargez jamais une bouteille. Les éléments de la bouteille ne doivent jamais être modifiés ou remplacés.

3. Boyau

Utilisation interdite. N'utilisez jamais un boyau autre que celui approprié au gaz indiqué. La règle générale d'identification est: rouge pour les gaz combustibles, vert pour l'oxygène, et noir pour les gaz inertes.

Utilisez des bagues ou colliers appropriés au boyau (et non du fil ordinaire ou autre substitution) pour brancher les boyaux à l'appareillage.

N'utilisez pas des raccords en cuivre. N'utilisez que des accessoires standard en laiton pour raccorder un boyau.

Utilisez une petite longueur de boyau. Cela évitera les noeuds et l'usure prématûre. Suspendez le boyau au-dessus du sol pour éviter qu'il ne soit écrasé, piétiné ou endommagé.

Enroulez le surplus de boyau pour éviter les noeuds et emmêlements. Évitez que le boyau ne soit endommagé par des tranchants, étincelles, laitier et flamme nue.

Repair leaky or worn hose by cutting area out and splicing (1-2D3). Do NOT use tape.

4. Proper Connections

Clean cylinder valve outlet of impurities that may clog orifices and damage seats before connecting regulator. Except for hydrogen, crack valve momentarily, pointing outlet away from people and sources of ignition. Wipe with a clean lintless cloth.

Match regulator to cylinder. Before connecting, check that the regulator label and cylinder marking agree, and that the regulator inlet and cylinder outlet match. NEVER CONNECT a regulator designed for a particular gas or gases to a cylinder containing any other gas.

Tighten connections. When assembling threaded connections, clean and smooth seats where necessary. Tighten. If connection leaks, disassemble, clean, and retighten using properly fitting wrench.

Adapters. Use a CGA adapter (available from your supplier) between cylinder and regulator, if one is required. Use two wrenches to tighten adapter marked RIGHT and LEFT HAND threads.

Regulator outlet (or hose) connections may be identified by right hand threads for oxygen and left hand threads (with grooved hex on nut or shank) for fuel gas.

5. Pressurizing Steps:

Drain regulator of residual gas through suitable vent before opening cylinder (or manifold valve) by turning adjusting screw in (clockwise). Draining prevents excessive compression heat at high pressure seat by allowing seat to open on pressurization. Leave adjusting screw engaged slightly on single-stage regulators.

Stand to side of regulator while opening cylinder valve.

Open cylinder valve slowly so that regulator pressure increases slowly. When gauge is pressurized (gauge reaches regulator maximum) leave cylinder valve in following position: For oxygen, and inert gases, open fully to seal stem against possible leak. For fuel gas, open to less than one turn to permit quick emergency shutoff.

Use pressure charts (available from your supplier) for safe and efficient, recommended pressure settings on regulators.

Check for leaks on first pressurization and regularly there-after. Brush with soap solution (capful of Ivory Liquid* or equivalent per gallon of water). Bubbles indicate leak. Clean off soapy water after test; dried soap is combustible.

E. User Responsibilities

Remove leaky or defective equipment from service immediately for repair. See User Responsibility statement in equipment manual.

*Trademark of Proctor & Gamble

Vérifiez régulièrement les fuites, l'usure et les rac-cordements lâches. Plongez le boyau sous pression dans de l'eau; les bulles indiqueront les fuites.

Réparation. Coupez la partie percée ou usée, et rac-cordez (1-2D3). N'UTILISEZ JAMAIS de ruban adhésif.

4. Branchements corrects

Avant de brancher le détendeur, nettoyez la sortie du robinet de la bouteille des impuretés qui peuvent obstruer les orifices et endommager les sièges. Sauf pour l'hydrogène, ouvrez momentanément le robinet, en éloignant la sortie des personnes et des sources in-flammables. Essuyez avec un tissu propre et non graisseux.

Appareillez le détendeur à la bouteille. Avant de bran-cher, vérifiez que la marque du détendeur et la descrip-tion de la bouteille concordent, et que l'orifice d'entrée du détendeur et l'orifice de sortie de la bouteille aillent ensemble. NE BRANCHEZ JAMAIS un détendeur conçu pour un gaz spécial (ou des gaz spéciaux) à une bouteille contenant d'autres gaz.

Serrez les branchements. Lorsque vous assemblez des branchements filetés, nettoyez et polissez les sièges où c'est nécessaire. Serrez. Si les branchements perdent, démontez-les, nettoyez et resserez avec une clef adé-quate.

Adaptateurs. Placez, si besoin est, un adaptateur CGA (en vente chez votre fournisseur) entre la bouteille et le détendeur. Avec deux clefs, serrez l'adaptateur fileté À DROITE et À GAUCHE.

On peut reconnaître les branchements de sortie du détendeur (ou boyau) à l'aide du filetage à droite pour l'oxygène et à gauche (identifié par un écrou cannelé) pour les gaz combustibles.

5. Démarches de mise en pression

Purgez le détendeur de résidu de gaz avant d'ouvrir la bouteille (ou le robinet de canalisation) en serrant la vis de réglage (dans le sens des aiguilles d'une montre). Cette opération permet au siège de haute pression de s'ouvrir à la mise en pression, supprimant ainsi toute surchauffe de compression. Maintenez la vis de réglage des détendeurs à simple détente légèrement engagée. Avant d'ouvrir le robinet de la bouteille, assurez-vous que les boyaux sont branchés et que les soupapes aval sont fermées.

Tenez-vous latéralement au détendeur en ouvrant le robinet de la bouteille. Ouvrez-le lentement pour que la pression du détendeur monte progressivement. Lorsque le manomètre est mis sous pression (indique le maximum) le robinet de la bouteille de gaz inerte ou d'oxygène devra être ouvert à fond pour assurer l'étanchéité et celui de la bouteille de gaz combustible ouvert de moins d'un tour pour pouvoir le refermer rapidement en cas d'urgence.

Référez-vous aux tableaux de pression (distribués par votre fournisseur) pour un réglage recommandé de pression sûr et efficace sur les détendeurs. Vérifiez les fuites à la première mise en pression puis régulièrement, brossez avec une solution savonneuse (un bouchon d'Ivory Liquid* ou semblable par gallon d'eau). Les bulles indiquent une fuite. Enlevez l'eau savonneuse après examen; le savon sec est inflammable.

*Marque de Commerce de Proctor & Gamble

F. Leaving Equipment Unattended

Close gas supply at source and drain gas.

G. Rope Staging-Support

Rope staging-support should not be used for welding or cutting operation; rope may burn.

1-3. ARC WELDING - Comply with precautions in 1-1, 1-2, and this section. Arc Welding, properly done, is a safe process, but a careless operator invites trouble. The equipment carries high currents at significant voltages. The arc is very bright and hot. Sparks fly, fumes rise, ultraviolet and infrared energy radiates, weldments are hot, and compressed gases may be used. The wise operator avoids unnecessary risks and protects himself and others from accidents. Precautions are described here and in standards referenced in index.

A. Burn Protection

Comply with precautions in 1-2.

The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light-colored surfaces, and burn the skin and eyes. Skin burns resemble acute sunburn, those from gas-shielded arcs are more severe and painful. **DON'T GET BURNED; COMPLY WITH PRECAUTIONS.**

1. Protective Clothing

Wear long-sleeve clothing (particularly for gas-shielded arc) in addition to gloves, hat, and shoes (1-2A). As necessary, use additional protective clothing such as leather jacket or sleeves, flame-proof apron, and fire-resistant leggings. Avoid outergarments of untreated cotton.

Bare skin protection. Wear dark, substantial clothing. Button collar to protect chest and neck and button pockets to prevent entry of sparks.

2. Eye and Head Protection

Protect eyes from exposure to arc. **NEVER** look at an electric arc without protection.

Welding helmet or shield containing a filter plate shade no. 12 or denser must be used when welding. Place over face before striking arc.

Protect filter plate with a clear cover plate.

Cracked or broken helmet or shield should NOT be worn; radiation can pass through to cause burns.

Cracked, broken, or loose filter plates must be replaced IMMEDIATELY. Replace clear cover plate when broken, pitted, or spattered.

E. Responsabilités de l'usager

Ôtez immédiatement les parties percées ou défectueuses. Voir les Responsabilités de l'Usager du manuel de l'appareil.

F. Appareil laissé sans surveillance

Fermez l'alimentation de gaz à la source et purgez.

G. Liens et supports temporaires

Pour vos travaux de soudage ou de coupe, n'utilisez pas de la corde comme soutien, elle est inflammable.

1-3. SOUDAGE À L'ARC - Conformez-vous aux précautions des paragraphes 1.1 et 1.2 de cette section. Le soudage à l'arc bien exécuté est sûr, mais un soudeur négligent est un danger. Le poste de soudage transporte des courants élevés sous de fortes tensions. L'arc est très vif et chaud. Les étincelles volent, les vapeurs montent, l'énergie ultra-violette et infrarouge rayonnent, les soudures sont chaudes, et des gaz comprimés peuvent être utilisés. Le soudeur prudent évite les risques inutiles, se protège et protège autrui contre les accidents. Les précautions sont décrites ici et dans les normes données dans l'Index.

A. Protection contre les brûlures

Conformez-vous aux précautions du paragraphe 1.2. L'arc de soudage est intense et visuellement vif. Son rayonnement peut blesser les yeux, traverser les habits légers, se réfléchir sur les surfaces claires, et brûler la peau et les yeux. Les brûlures de la peau ressemblent à un gros coup de soleil. Celles d'arcs sous gaz protecteur sont plus graves et plus douloureuses. **NE VOUS BRÛLEZ PAS - SUIVEZ LES PRÉCAUTIONS.**

1. Vêtements de protection

Portez des vêtements à manches longues (surtout pour l'arc en atmosphère inerte) avec gants, masque et chaussures (1.2A.).

Si nécessaire portez en plus une veste ou des manches en cuir, un tablier et des guêtres ignifugés. De préférence ne portez pas de vêtements en coton non traité.

Protection de la peau. Portez des vêtements épais foncés. Boutonnez le col pour protéger la poitrine et le cou, et boutonnez les poches pour prévenir l'infiltration d'étincelles.

2. Protection des yeux et de la tête

Évitez que vos yeux soient exposés à l'arc. **NE REGARDEZ JAMAIS** un arc électrique sans protection.

Lorsque vous soudez, portez un écran ou masque avec verre filtrant teinté N° 12 ou plus foncé. Mettez-le sur le visage avant d'amorcer l'arc.

Protégez le verre filtrant d'un couvre-verre clair. **NE PORTEZ PAS** un masque fendu ou brisé; le rayonnement peut s'infiltrer et causer des brûlures.

Les verres filtrants fendus, brisés ou lâches doivent être remplacés IMMÉDIATEMENT. Remplacez un couvre-verre brisé, piqué ou taché par des projections.

Flash goggles with side shields **MUST** be worn under the helmet to give some protection to the eyes should the helmet not be lowered over the face before an arc is struck. Looking at an arc momentarily with unprotected eyes (particularly a high intensity gas-shielded arc) can cause a retinal burn that may leave a permanent dark area in the field of vision.

3. Protection of Nearby Personnel

Enclosed welding area. For production welding, a separate room or enclosed bay is best. In open areas, surround the operation with low-reflective, non-combustible screens or panels. Allow for free air circulation, particularly at floor level.

Viewing the weld. Provide face shields for all persons who will be looking directly at the weld.

Others working in area. See that all persons are wearing flash goggles.

Before starting to weld, make sure that screen flaps or bay doors are closed.

B. Toxic Fume Prevention

Comply with precautions in 1-2B.

Generator engine exhaust must be vented to the outside air. Carbon monoxide can kill.

C. Fire and Explosion Prevention

Comply with precautions in 1-2C.

Equipment's rated capacity. Do not overload arc welding equipment. It may overheat cables and cause a fire.

Loose cable connections may overheat or flash and cause a fire.

Never strike an arc on a cylinder or other pressure vessel. It creates a brittle area that can cause a violent rupture or lead to such a rupture later under rough handling.

D. Compressed Gas Equipment

Comply with precautions in 1-2D.

E. Shock Prevention

Exposed hot conductors or other bare metal in the welding circuit, or in ungrounded, electrically-HOT equipment can fatally shock a person whose body becomes a conductor. **DO NOT STAND, SIT, LIE, LEAN ON, OR TOUCH** a wet surface when welding, without suitable protection.

Vous devez porter des lunettes à écrans latéraux sous le masque pour protéger les yeux dans le cas où le masque ne serait pas abaissé sur le visage avant l'amorçage de l'arc. Regarder momentanément un arc sans protection (principalement un arc en atmosphère inerte à haute intensité) peut brûler la rétine et laisser un point sombre permanent dans le champ de vision.

3. Protection du personnel à proximité

Local de soudage fermé. Pour le soudage de production, il vaut mieux utiliser une salle séparée ou une baie fermée. Dans les locaux ouverts, entourez les travaux d'écrans ou panneaux peu réfléchissants et ininflammables. Laissez l'air circuler librement, particulièrement au niveau du sol.

Donnez des masques aux personnes qui regarderont directement la soudure.

Autres personnes travaillant sur les lieux. Veillez à ce que toutes les personnes portent les lunettes de protection.

Avant d'attaquer la soudure, assurez-vous que les rebords d'écran ou les portes soient fermés.

B. Prévention des gaz toxiques

Suivez les précautions du paragraphe 1.2B. L'échappement du moteur de la génératrice doit être ventilé à l'air extérieur. L'oxyde de carbone peut tuer.

C. Prévention des incendies et des explosions

Suivez les précautions 1.2C. Puissance nominale de l'appareil. Ne surchargez pas le poste de soudage à l'arc. Cela peut surchauffer les câbles et causer un incendie.

Les branchements lâches de câble peuvent surchauffer ou faire des étincelles et causer un incendie.

N'amorcez jamais un arc sur une bouteille ou autre récipient sous pression. Cela créerait un point de rupture entraînant à plus ou moins longue échéance l'explosion du réservoir.

D. Gaz comprimé

Suivez les précautions 1.2D.

E. Prévention des décharges électriques

Des conducteurs chargés ou métal nu incorporés au circuit de soudage ou à un appareil chargé sans mise à la terre peuvent donner une décharge fatale à la personne dont le corps devient conducteur. **NE SOUDEZ PAS DEBOUT, ASSIS, COUCHÉ, PENCHÉ** sur une surface humide ni en contact avec une telle surface sans protection appropriée.

To protect against shock:

Keep body and clothing dry. Never work in damp area without adequate insulation against electrical shock. Stay on a dry duckboard, or rubber mat when dampness or sweat can not be avoided. Sweat, sea water, or moisture between body and an electrically HOT part - or grounded metal - reduces the body surface electrical resistance, enabling dangerous and possibly lethal currents to flow through the body.

1. Grounding the Equipment

When arc welding equipment is grounded according to the National Electrical Code, and the work is grounded according to ANSI Z49.1 "Safety in Welding And Cutting," a voltage may exist between the electrode and any conducting object. Examples of conducting objects include, but are not limited to, buildings, electrical tools, work benches, welding power source cases, workpieces, etc. **Never touch the electrode and any metal object unless the welding power source is off.**

When installing, connect the frames of each unit such as welding power source, control, work table, and water circulator to the building ground. Conductors must be adequate to carry ground currents safely. Equipment made electrically HOT by stray current may shock, possibly fatally. Do NOT GROUND to electrical conduit, or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

Three-phase connection. Check phase requirements of equipment before installing. If only 3-phase power is available, connect single-phase equipment to only two wires of the 3-phase line. Do NOT connect the equipment ground lead to the third (live) wire, or the equipment will become electrically HOT - a dangerous condition that can shock, possibly fatally.

Before welding, check ground for continuity. Be sure conductors are touching bare metal of equipment frames at connections.

If a line cord with a ground lead is provided with the equipment for connection to a switchbox, connect the ground lead to the grounded switchbox. If a three-prong plug is added for connection to a grounded mating receptacle, the ground lead must be connected to the ground prong only. If the line cord comes with a three-prong plug, connect to a grounded mating receptacle. Never remove the ground prong from a plug, or use a plug with a broken off ground prong.

2. Electrode Holders

Fully insulated electrode holders should be used. Do NOT use holders with protruding screws.

3. Connectors

Fully insulated lock-type connectors should be used to join welding cable lengths.

Pour vous protéger contre les décharges électriques, maintenez votre corps et vêtements secs. Ne travaillez jamais dans un endroit humide sans isolation adéquate contre les décharges électriques. Lorsque vous ne pouvez éviter l'humidité ou la sueur, placez-vous sur un caillbotis sec ou un tapis en caoutchouc. La sueur, l'eau de mer, ou l'humidité entre le corps et une pièce CHARGÉE, ou une pièce de métal à la masse, réduisent la résistance électrique de la surface du corps, permettant l'entrée de courants dangereux, voire mortels.

1. Mise à la terre de l'appareil

Lorsque l'appareil de soudage à l'arc est mise à la terre suivant la norme National Electrical Code, et la masse est mise à la terre suivant la norme ANSI Z49.1 "Safety in Welding and Cutting," une tension peut exister entre l'électrode et un objet conducteur. Certaines de ces objets sont par exemple (mais pas seulement), des bâtiments, des outils électriques, des établis, des châssis de postes de soudure, des pièces d'ouvrage, etc. **Ne jamais touchez l'électrode ou des objets en métal avant d'avoir mis le poste de soudure à l'arrêt.**

À l'installation, branchez les châssis de chaque élément (source de courant, commande, établi et circuit d'eau) à la terre. Les conducteurs doivent pouvoir conduire les courants telluriques en toute sécurité. L'appareil chargé par les courants vagabonds peut donner une décharge risquant d'être mortelle. **NE BRANCHEZ PAS VOTRE PRISE DE TERRE à une conduite électrique, ou à un tuyau de gaz ou de liquide inflammable tel que l'huile ou un combustible.**

Connexion triphasée. Avant l'installation vérifiez la phase nécessaire à l'appareil. Si seul le triphasé est disponible, ne branchez l'appareil monophasé qu'à deux des fils de la ligne triphasée. **NE BRANCHEZ PAS le conducteur de terre de l'appareil au troisième fil (sous tension), autrement l'appareil serait chargé: condition dangereuse pouvant donner une décharge fatale.**

Avant le soudage, vérifiez si la prise de terre est uniforme. En branchant, assurez-vous que les conducteurs touchent le métal nu du châssis de l'appareil.

Lorsqu'un appareil doit être alimenté à partir d'un coffret d'alimentation, le conducteur de terre doit être relié à celui-ci.

Si vous avez en plus une fiche à trois broches pour la terre, ne branchez le conducteur de terre qu'à la broche de terre. Si le cordon d'alimentation a une fiche à trois broches, reliez-le à une prise femelle tripolaire reliée à la terre. N'enlevez jamais la broche de terre d'une fiche ou n'utilisez jamais une fiche dont la broche de terre serait brisée.

2. Pince-électrodes

Utilisez des pince-électrodes bien isolées. **N'UTILISEZ PAS des pince-électrodes avec vis saillantes.**

3. Connecteurs

Utilisez des connecteurs à verrouillage bien isolés pour assembler de longs câbles.

4. Cables

Frequently inspect cables for wear, cracks and damage. IMMEDIATELY REPLACE those with excessively worn or damaged insulation to avoid possibly - lethal shock from bared cable. Cables with damaged areas may be taped to give resistance equivalent to original cable.

Keep cable dry, free of oil and grease, and protected from hot metal and sparks.

5. Terminals And Other Exposed Parts.

Terminals and other exposed parts of electrical units should have insulating covers secured before operation.

6. Electrode

a. Equipment with output on/off control (contactor)

Welding power sources for use with the gas metal arc welding (GMAW), gas tungsten arc welding (GTAW) and similar processes normally are equipped with devices that permit on-off control of the welding power output. When so equipped the electrode wire becomes electrically HOT when the power source switch is ON and the welding gun switch is closed. Never touch the electrode wire or any conducting object in contact with the electrode circuit unless the welding power source is off. .

b. Equipment without output on/off control (no contactor)

Welding power sources used with shielded metal arc welding (SMAW) and similar processes may not be equipped with welding power output on-off control devices. With such equipment the electrode is electrically HOT when the power switch is turned ON. Never touch the electrode unless the welding power source is off.

7. Safety Devices

Safety devices such as interlocks and circuit breakers should not be disconnected or shunted out.

Before installation, inspection, or service, of equipment, shut OFF all power and remove line fuses (or lock or red-tag switches) to prevent accidental turning ON of power. Disconnect all cables from welding power source, and pull all 115 volts line-cord plugs.

Do not open power circuit or change polarity while welding. If, in an emergency, it must be disconnected, guard against shock burns, or flash from switch arcing.

Leaving equipment unattended. Always shut OFF and disconnect all power to equipment.

Power disconnect switch must be available near the welding power source.

4. Câbles

Vérifiez fréquemment l'usure, les fissures et l'altération des câbles. REMPLACEZ IMMÉDIATEMENT ceux dont l'isolation serait trop usée ou altérée pour prévenir les décharges mortelles provoquées par un câble dénudé. Vous pouvez enrouler les parties endommagées de ruban adhésif en épaisseur suffisante pour donner une résistance de câble neuf. Maintenez les câbles secs, dépourvus d'huile et de graisse et mettez-les à l'abri du métal chaud et des étincelles.

5. Têtes de câbles et autres parties dénudées

Avant la mise en marche, les têtes de câbles et autres parties dénudées d'un appareil électrique doivent être munies de leurs couvrefils isolants.

6. Électrode

a. Appareil équipé d'une commande marche/arrêt (contacteur)

En général, les postes de soudure utilisés pour le soudage à l'arc sous protection gazeuse avec électrode fusible (GMAW), ou avec électrode tungstène (GTAW) et des procès semblables sont équipés d'une commande marche/arrêt de la puissance de sortie. Lorsque l'interrupteur est en position "MARCHE" et l'interrupteur du pistolet est fermé, le fil d'électrode devient chargé. Ne touchez jamais le fil électrode ou tout autre objet conducteur faisant contact avec le circuit d'électrode sans couper le courant au poste de soudure.

b. Appareil non-équipé d'une commande marche/arrêt (sans contacteur)

Les postes de soudure utilisés pour le soudage à l'arc avec électrode enrobée (SMAW) et des procès semblables peuvent être non-équipés d'une commande marche/arrêt de la puissance de sortie. Lorsque l'interrupteur est en position "MARCHE" l'électrode devient chargé. Ne touchez jamais l'électrode sans couper le courant au poste de soudure.

7. Dispositif de sécurité

Le dispositif de sécurité-verrouillage et coupe-circuit ne doit pas être débranché ou déshunté.

Avant l'installation, l'inspection ou la réparation de l'appareil, mettez l'alimentation sur ARRÊT et enlevez les fusibles généraux (ou verrouillez les interrupteurs) pour éviter une remise en MARCHE accidentelle. Débranchez tous les câbles de la source de courant ainsi que les prises des cordons d'alimentation en 115 volts.

Lors du soudage, n'ouvrez pas le circuit d'alimentation et ne changez pas la polarité. S'il est débranché au cours d'une urgence, faites attention aux brûlures de décharge ou aux jaillissements d'étincelles.

Appareil laissé sans surveillance. Mettez toujours sur ARRÊT et débranchez l'appareil.

F. Protection For Wearers Of Electronic Life Support Devices (Pacemakers)

Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult with their doctor before going near arc welding, gouging, or spot welding operations.

1-4. STANDARDS BOOKLET INDEX - For more information, refer to the following standards or their latest revisions and comply as applicable:

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 550 Le Jeune Rd, P.O. Box 351040, Miami, FL 33135.
2. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
3. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135.
8. NFPA Standard 51, OXYGEN - FUEL GAS SYSTEMS FOR WELDING AND CUTTING obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
9. NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

L'interrupteur d'arrêt doit toujours se trouver à proximité de la source de courant.

F. Protection pour toute personne portant des appareils électroniques de sauvetage (appareil pour le règlement de battement de cœur)

Inducteurs de courant élevé peuvent nuire le fonctionnement d'un appareil pour le "règlement de battement de cœur." Toute personne portant un appareil électronique de sauvetage (appareil pour le règlement de battement de cœur), devrait consulter un docteur avant d'approcher toute opération de soudage à l'arc, à la gouge ou à point.

1-4. INDEX DES NORMES - Pour plus de renseignements, référez-vous aux normes de l'ACNOR ou aux normes américaines suivantes:

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING distribué par l'American Welding Society, 550 Le Jeune Rd., P.O. Box 351040 Miami, FL 33135
2. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING distribué par le Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402
3. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, distribué par U.S. Department of Labor, Washington D.C. 20210
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION distribué par l'American National Standards Institute, 1430 Broadway, New York, NY 10018
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR distribué par l'adresse donnée en 4.
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES distribué par l'adresse donnée en 4.
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE COMBUSTIBLES distribué par l'adresse donnée en 1.
8. NFPA Standard 51, OXYGEN - FUEL GAS SYSTEMS FOR WELDING AND CUTTING distribué par la National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
9. NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE distribué par l'adresse donnée en 8
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES distribué par l'adresse donnée en 8

11. CGA Pamphlet P-1, **SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS** obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
12. CSA Standard W117.2, **CODE FOR SAFETY IN WELDING AND CUTTING** obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.
13. NWSA booklet, **WELDING SAFETY BIBLIOGRAPHY** obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.
14. American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135.
15. ANSI Standard Z88.2 "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
11. CGA Pamphlet P-1, **SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS** distribué par la Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
12. CSA Standard W117.2, **CODE FOR SAFETY IN WELDING AND CUTTING** distribué par la Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.
13. NWSA booklet, **WELDING SAFETY BIBLIOGRAPHY** distribué par la National Welding Supply Association, 1900 Arch Street Philadelphia, PA 19103.
14. American Welding Societe Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", distribué par l'American Welding Societe, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135
15. ANSI Standard Z88.2 "Practice For Respiratory Protection" distribué par l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

SECTION 2 - INTRODUCTION

Model	Rated Amperes Output 60% Duty Cycle	Max. Open-Circuit Voltage	Input At Rated Load Output 60 Hz Single-Phase					kw	Overall Dimensions	Weight	
			208 Volts	230 Volts	460 Volts	575 Volts	kva			Net	Ship
Without Spot Weld Panel	150 Amperes @ 23 Volts	32	26.5	24	12	9.6	5.5	4.8	Height: 30 in. (762mm) Width: 13-1/2 in. (343mm) Depth: 27 in. (686mm)	200 lbs. (91 kg)	210 lbs. (95 kg)
With Spot Weld Panel										205 lbs. (93 kg)	215 lbs. (98 kg)

Figure 2 - 1. Specifications

2 - 1. GENERAL INFORMATION AND SAFETY

A. General

Information presented in this manual and on various labels, tags, and plates provided on this unit pertains to equipment design, installation, operation, maintenance and troubleshooting which should be read, understood and followed for the safe and effective use of this equipment.

The nameplate of this unit uses international symbols for labeling the front panel controls. The symbols also appear at the appropriate section in the text.

B. Safety

The installation, operation, maintenance, and troubleshooting of arc welding equipment requires practices and procedures which ensure personal safety and the safety of others. Therefore, this equipment is to be installed, operated and maintained only by qualified persons in accordance with this manual and all applicable codes such as, but not limited to, those listed at the end of Section 1 - Safety Rules For Operation Of Arc Welding Power Source.

Safety instructions specifically pertaining to this unit appear throughout this manual highlighted by the signal words **WARNING** and **CAUTION** which identify different levels of hazard.

WARNING statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in serious personal injury or loss of life.

CAUTION statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in minor personal injury or damage to this equipment.

A third signal word, **IMPORTANT**, highlights instructions which need special emphasis to obtain the most efficient operation of this equipment.

2 - 2. RECEIVING-HANDLING - Before installing this equipment, clean all packing material from around the unit and carefully inspect for any damage that may have occurred during shipment. Any claims for loss or damage that may have occurred in transit must be filed by the purchaser with the carrier. A copy of the bill of lading will be furnished by the manufacturer on request if occasion to file claim arises.

When requesting information concerning this equipment, it is essential that Model Description and Serial Number of the equipment be supplied.

2 - 3. DESCRIPTION - This constant voltage dc arc welding power source and wire feeder system is designed for the Gas Metal Arc Welding (MIG) process. Normal operation requires the welding gun be connected to the (+) POSITIVE weld output receptacle while the workpiece is connected to the (-) NEGATIVE weld output receptacle.

This unit consists of a single-phase welding power source with built-in wire feeder, quick disconnect gun with all necessary interconnecting cables, running gear, and assembly hardware. Models with the optional SPW 1 panel provide the controls for regulating spot weld time/pulse on time, burnback time, and pulse off time.

2 - 4. DUTY CYCLE (Figure 2-2) - The duty cycle of a welding power source is the percentage of a ten minute period that a welding power source can be operated at a given output without causing overheating and damage to the unit. This welding power source is rated at 60 percent duty cycle. This means that the welding power source can be operated at rated load for six minutes out of every ten. During the remaining four minutes, the unit should idle to permit proper cooling. If the welding amperes are decreased, the duty cycle will increase. Figure 2-2 enables the operator to determine the output of the welding power source at various duty cycles.

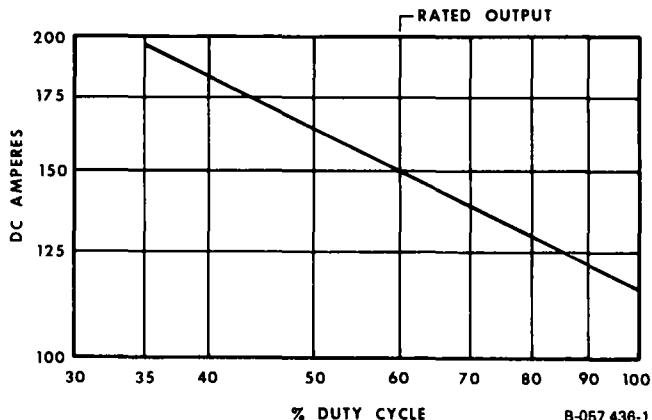


Figure 2-2. Duty Cycle Chart

CAUTION: EXCEEDING DUTY CYCLE RATINGS
will damage the welding power source.

- Do not exceed indicated duty cycles.

2 - 5. VOLT-AMPERE CURVES (Figure 2-3) - The volt-ampere curves are provided to show the available output of the welding power source in each of the output receptacle taps with the FINE TUNING/WIRE SPEED control at the maximum position. Different settings on the FINE TUNING/WIRE SPEED control will yield different volt-ampere curves. Consult Table 6-1 (Range Selection Chart) for specific information to be used in conjunction with the volt-ampere curves.

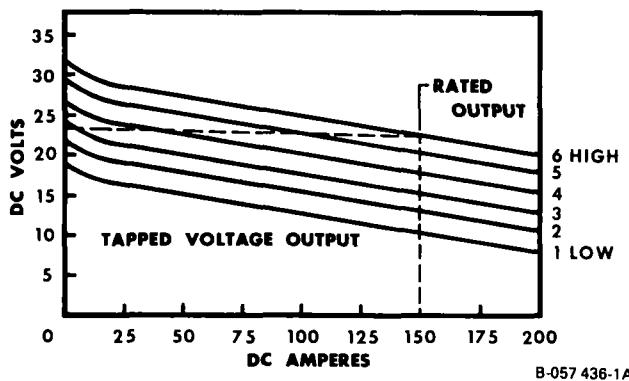


Figure 2-3. Volt-Ampere Curves

2 - 6. DESCRIPTION OF SUPPLIED PARTS (Figure 2-4)

- Running Gear
- Jack Plugs
- Wall Receptacle And Plug (208/230 volt models only)
- MWG 200 Gun, Nozzle, And Six Contact Tubes.
- Nine Feet (2.8 m) Of 3-Conductor Input Cord
- Work Cable And Work Cable Clamp
- Optional SPW 1 Panel And Three Nozzles

2 - 7. ADDITIONAL SUPPLIES REQUIRED (Figure 2-5)

IMPORTANT: Contact your supplier or see the yellow pages of the local telephone book for the location of the nearest Auto Arc Distributor.

A. Gas Cylinder

Two types of gas mixtures are generally used with MIG welders in the repair of automotive sheet steel. A mixture of 75 percent argon and 25 percent carbon dioxide will provide a smoother welding appearance, less spatter, and a more stable arc than straight carbon dioxide. Welding grade carbon dioxide will do an acceptable job; however, it does produce more spatter, a more violent and less stable arc, and it penetrates deeper and may cause burn through problems on light gauge sheet steel.

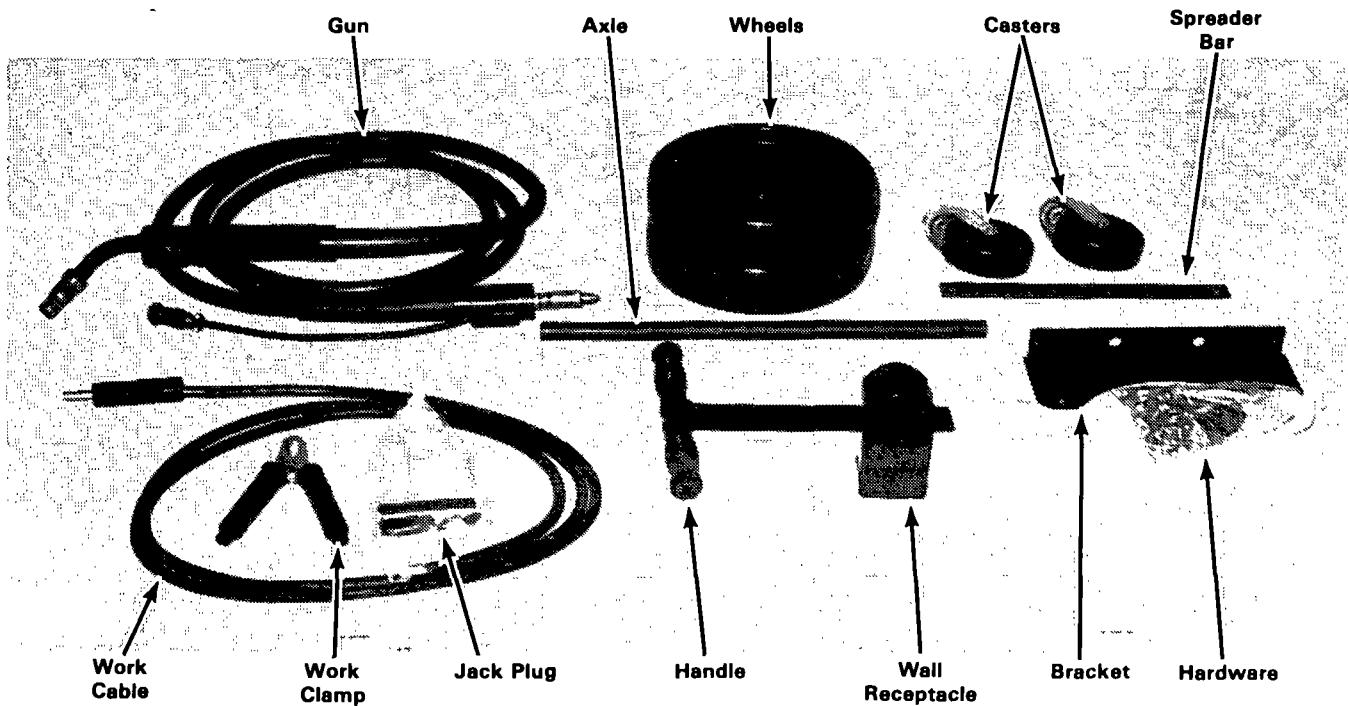


Figure 2-4. Supplied Parts

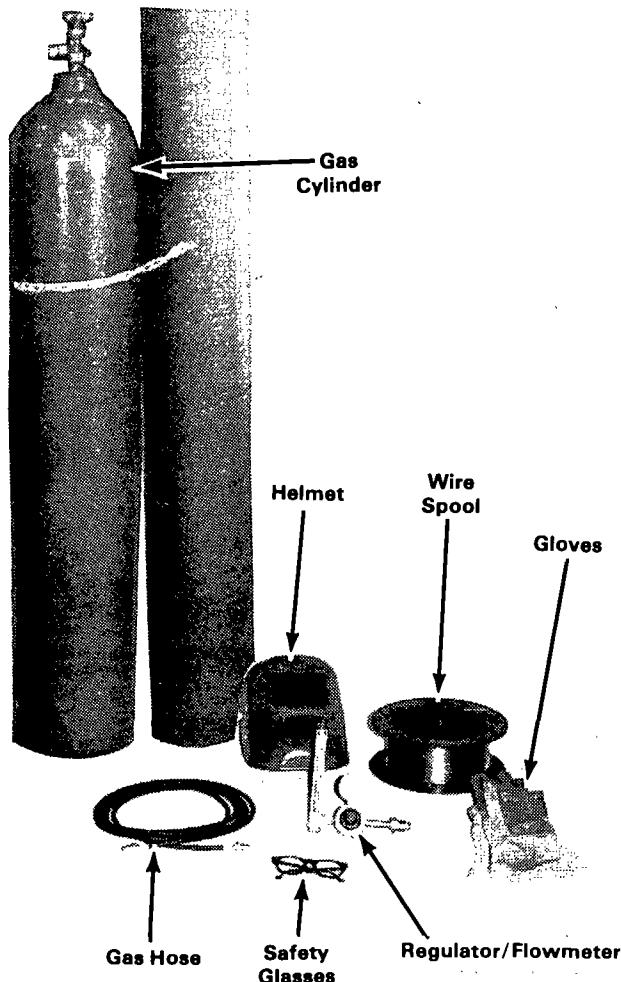


Figure 2-5. Additional Supplies Required

B. Regulator/Flowmeter

Regulator/flowmeters are used to provide a constant shielding gas pressure and flow rate to the weld area during the welding process. Because gases have different properties, each regulator/flowmeter is designed to be used with a specific gas or mixture of gases. Regulator/flowmeters cannot be changed from one gas to another unless the proper adapters are installed. Be sure to obtain the proper regulator/flowmeter for the type of shielding gas that will be used with this welding power source.

C. Gas Hose

Use approximately 8 ft. (2.4 m) of good quality 5/8 in. S.A.E. gas hose with fittings.

D. Spool Of Wire

An important factor to consider in MIG welding is the selection of the correct welding wire. There are many types to choose from, but certain wires are best suited for welding on automotive sheet steel. The American Welding Society (AWS) classification for MIG wires is usually indicated on the label of the wire spool. Two AWS wire classes commonly used in the repair of automotive sheet steel are E70S-6 and E70S-3. The E70S-6 will provide a more fluid (wetter) weld puddle and a flatter bead; however, E70S-3 is acceptable for use with this welding power source.

E. Helmet, Gloves, Safety Glasses

When using this welding power source it is important that a welding helmet, fitted with the proper lens, be worn to protect the eyes from the welding arc. Also important is protective clothing, safety glasses, and gloves to prevent injury from flying sparks.

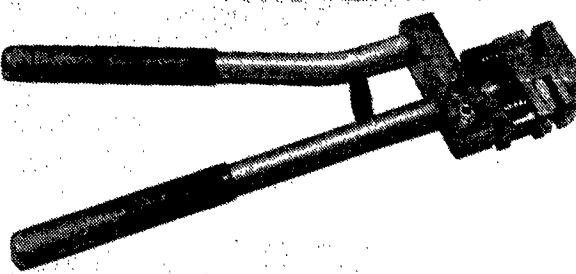


Figure 2-6. Offset/Punching Tool

F. Offset/Punching Tool (Figure 2-6)

The welding process in the repair of automotive sheet steel can be made easier with the use of a special Offset/Punching Tool. This tool has a dual purpose, rotating head. The damaged area is cut away and the jaws of the offset portion of the head are placed over the sheet steel. When pressure is applied to the handles the tool will indent a small offset in the sheet steel. A new piece of sheet steel is then cut to size and placed in position to overlap the offset portion. The new piece of sheet steel is then welded into place, sanded, filled with body putty and finished sanded. The head of the tool can be rotated one half turn to be used as a punching tool. The punching tool will expedite riveting operations. The use of this tool will help keep material use and finishing time to a minimum.

SECTION 3 - INSTALLATION

WARNING : ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Disconnect input power conductors from deenergized supply line BEFORE moving unit.*

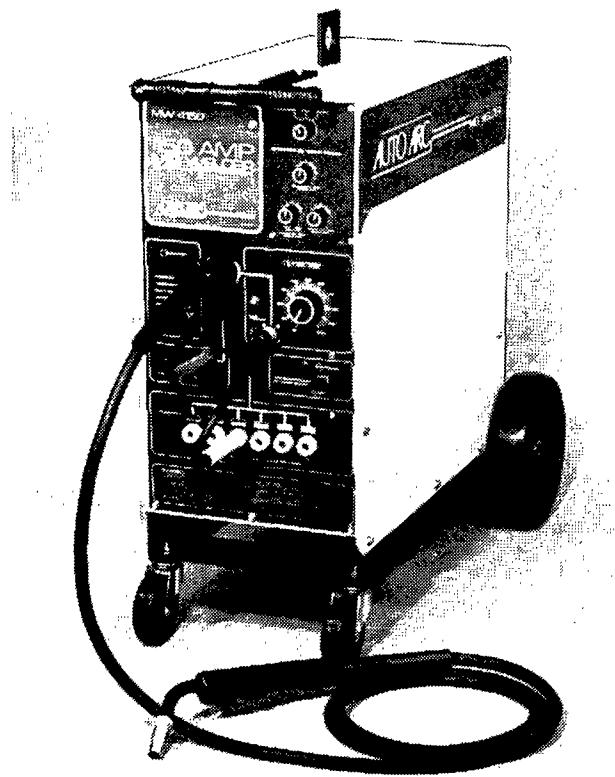


Figure 3-1. Completely Assembled Unit

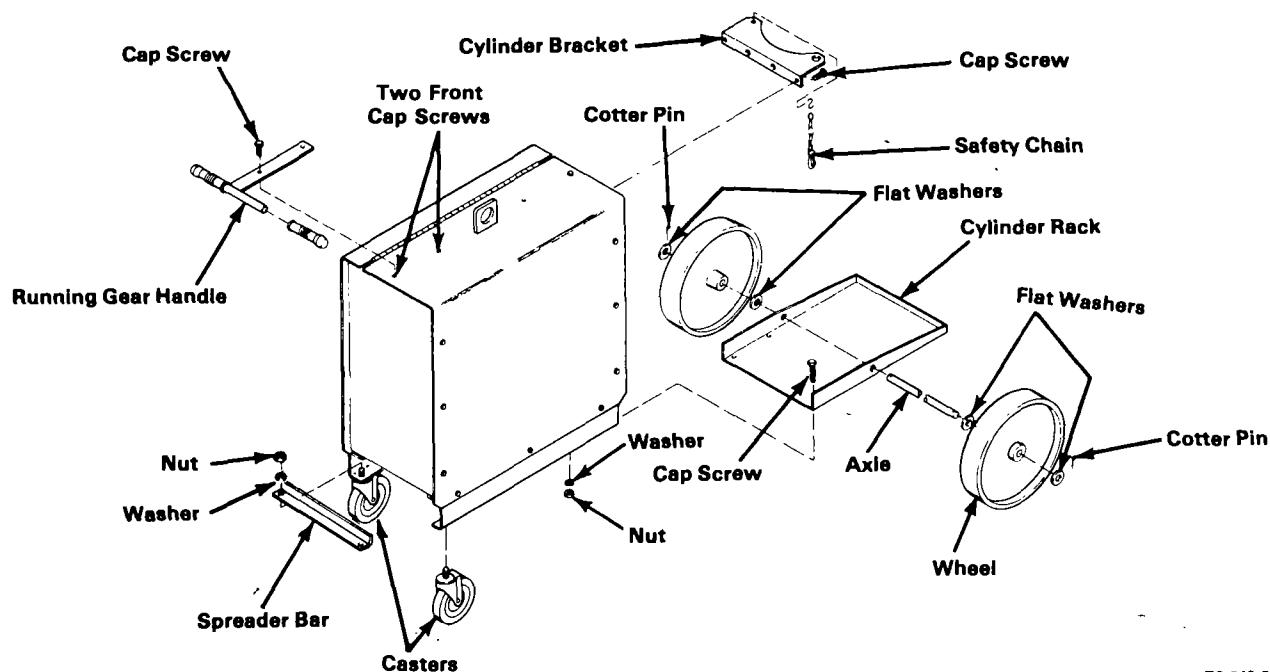
3 - 1. INSTALLATION OF THE WELDING POWER SOURCE ON RUNNING GEAR (Figure 3-2)

CAUTION: UNCONTROLLED TILTING OR TIPPING of unit can result in personal injury and equipment damage.

- *Use equipment of adequate capacity to lift the unit.*
- *If using lift forks to handle this unit, be sure the lift forks are long enough to extend out of the opposite side of the base.*
- *Do not place any part of the body under the unit while it is suspended.*

Place blocks under frame of unit before attaching running gear.

1. Install the two 4 inch (102 mm) casters and the spreader bar on the front corners of the welding power source base as shown in Figure 3-2 using 3/8 in. hardware.
2. Block the unit up securely in middle to ease installation of rear wheel/gas cylinder rack assembly.
3. Slide axle through cylinder rack and install a wheel on each end of axle with a 3/4 in. flat washer on each side of wheel. Secure the wheels in place with cotter pins by bending both legs of cotter pin around the axle in one direction or by bending one leg clockwise and the other leg counterclockwise (legs should conform to contour of axle as tightly as possible).



TC-049 808-C

Figure 3-2. Installation Of Running Gear

4. Install cylinder rack on welding power source base using 5/16-18 x 3/4 cap screws and associated hardware (see Figure 3-2).
5. Remove the two front cap screws in top of welding power source wrapper and discard. Install running gear handle to wrapper using 1/4-20 x 3/4 cap screws as shown in Figure 3-2.
6. Install cylinder bracket to rear panel of welding power source as shown in Figure 3-2 using 1/4-20 x 3/4 cap screws and existing holes in rear panel.
7. Set gas cylinder in rack and lock in position with safety chain. Cylinder must be secured at all times.

3 - 2. LOCATION (Figure 3-3) – A proper installation site should be selected for the welding power source if the unit is to provide dependable service, and remain relatively maintenance free.

A proper installation site permits freedom of air movement into and out of the welding power source, and also least subjects the units to dust, dirt, moisture, and corrosive vapors. A minimum of 18 inches (457 mm) of unrestricted space must be maintained between the welding power source front and rear panels and the nearest obstruction. Also, the underside of the welding power source must be kept completely free of obstructions. The installation site should also permit easy removal of the welding power source outer enclosure for maintenance functions.

CAUTION: RESTRICTED AIR FLOW causes overheating and possible damage to internal parts.

- Maintain at least 18 inches (457 mm) of unrestricted space on all sides of unit and keep underside free of obstructions.
- Do not place any filtering device over the intake air passages of this welding power source.

Warranty is void if any type of filtering device is used.

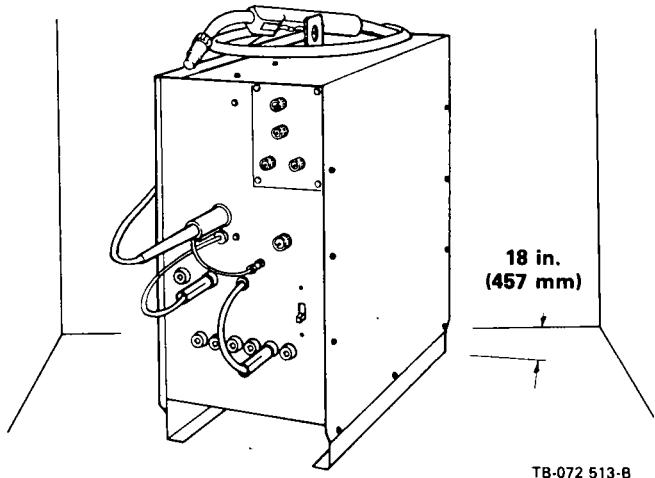


Figure 3-3. Location

If the unit has not been installed on the running gear, holes are provided in the base for mounting purposes in case a permanent location is desired.

CAUTION: IMPROPER LIFTING OF EQUIPMENT can result in personal injury and equipment damage.

- Use equipment of adequate capacity to lift the unit.
- If using lift forks to handle this unit, be sure the lift forks are long enough to extend out of the opposite side of the base.

Using lift forks too short will expose internal components to damage should the tips of the lift forks penetrate the bottom of the unit.

A lifting device is provided for moving the unit. However, if a fork lift vehicle is used for lifting the unit, be sure that the lift forks are long enough to extend completely under the base.

3 - 3. ELECTRICAL INPUT CONNECTIONS

A. Electrical Input Requirements

This welding power source is designed to be operated from a single-phase, 60 Hertz, ac power supply which has a line voltage rating that corresponds with one of the electrical input voltages shown on the nameplate or primary data label. Consult the local electric utility if there is any question about the type of electrical system available at the installation site or how proper connections to the welding power source are to be made.

B. Matching The Welding Power Source To The Available Input Voltage

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power and employ "lockout/tagging procedures" before internally inspecting or servicing.

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

CAUTION: INCORRECT INPUT VOLTAGE JUMPER LINK PLACEMENT can damage unit.

- Position jumper link as shown on the input voltage label located on primary terminal block.

The input voltage jumper link provided on the primary terminal block permits the welding power source to be operated from various line voltages. The various voltages from which this unit may be operated are stated on the nameplate and on the input voltage label. See Figure 3-6 for location of the primary terminal block and this label. The input voltage jumper link is positioned for the highest of the voltages stated on the nameplate. If the welding power source is to be operated from a line voltage which is lower than the highest voltage for which the unit was designed, the jumper link will have to be moved to the proper position before operating the unit. Steps 1-5 below provide instructions on repositioning the jumper link. If the available input voltage matches the highest voltage of the unit, skip Steps 1-5.

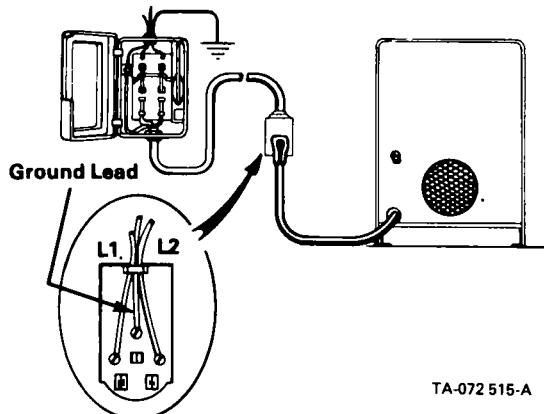


Figure 3 - 4. Input Connections

1. Use a 3/8 in. wrench to remove the cap screws from the welding power source wrapper (see Figure 3-5). Loosen the wing-headed screws which secure the door.
2. Lift outer enclosure upward to remove.
3. Locate Terminal Block where indicated in Figure 3-6.
4. Loosen the two screws securing the jumper link. Place the jumper link in the proper position before operating the unit. Tighten all screws securely.

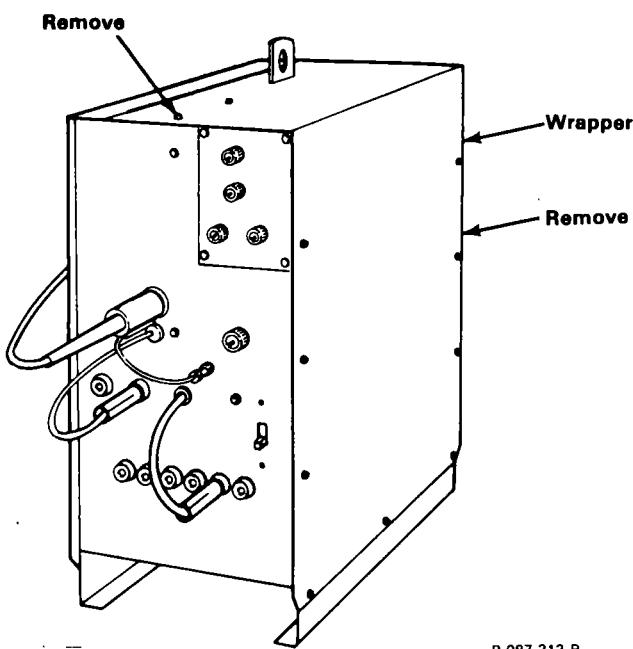


Figure 3 - 5. Wrapper Cap Screw Location

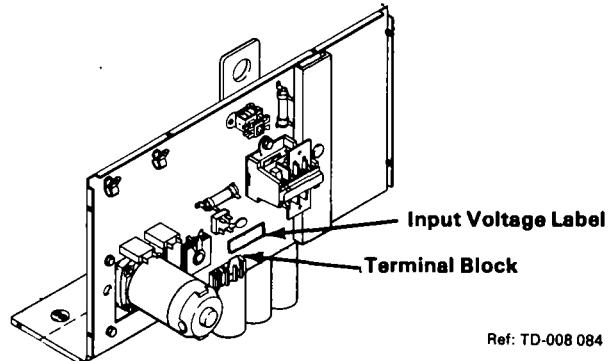


Figure 3 - 6. Primary Voltage Terminal Block Location

5. Replace outer enclosure.

C. Input Conductor Connections (Figure 3-4)

WARNING : ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- It is recommended that a fusible line disconnect switch be installed in the input circuit to the welding power source.

This would provide a safe and convenient means to completely remove all electrical power from the welding power source whenever it is necessary to internally inspect or service the unit.

- Employ "lockout/tagging procedures" on input line before making input connections to the welding power source.

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

- Connect unit to single-phase input power.
- Connect the ground (green) lead to a proper electrical ground.

Use a grounding method that is acceptable to the local electrical inspection authority. Ensure that black and white leads are connected to line terminals.

Table 3-1. Recommended Primary Wire & Fuse Size

Input Wire Size - AWG*				Fuse Size in Amperes			
208V	230V	460V	575V	208V	230V	460V	575V
10 (10)	10 (10)	14 (14)	14 (14)	40	35	20	15

*Input conductor sizes are based on National Electrical Code specifications for allowable ampacities of insulated copper conductors, having a temperature of 75°C, with not more than three conductors in a raceway or cable. Numbers in () are equipment ground conductor sizes.

All models are ordinarily equipped with a three-conductor power cord. Models requiring 208 or 230 volts input power are equipped with a three-prong polarized plug and wall receptacle. The wall receptacle should be installed in a convenient location by a competent electrician. The wall receptacle should be installed with the grounding terminal at the top. This would allow the power cable to hang downward without undue bending or twisting.

3 - 4. INSTALLATION OF THE SPOT WELD PANEL (Optional) (Figure 3-7)

WARNING : ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power and employ "lockout/tagging procedures" before internally inspecting or servicing.

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

IMPORTANT : All directions, such as left or right, are with respect to the operator facing the front panel.

1. Remove module cover plate from upper right-hand corner of front panel. Retain securing screws.



Figure 3-7. Spot Weld Panel

2. Locate wiring harness clamped to air baffle. Remove wiring harness from first clamp and carefully pull end of wiring harness with connectors through opening in front panel - it will come through approximately 2 in. (51 mm).
3. Disconnect and discard jumpered connector from plug PLG2.
4. Connect receptacle RC2 from SPW 1 panel to PLG2. Be sure the connectors are locked together.
5. Install SPW 1 panel into front panel using securing screws removed in Step 1.

3 - 5. WORK CABLE ASSEMBLY - A 10 foot (3 m) work cable with a lug on one end is included with this unit.

A. Installation Of Work Clamp (Figure 3-8)

Install the work clamp onto the work cable as follows:

1. Insert the end of the work clamp with the terminal lug on it through one of the two supplied insulating sleeves.
2. Lay the work cable inside the half of the work clamp which has the flattest inner surface.
3. Align the smaller hole in the work clamp with the hole in the work cable terminal lug. Secure the terminal lug to the work clamp with the supplied nut and bolt.

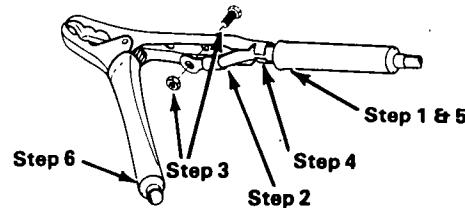


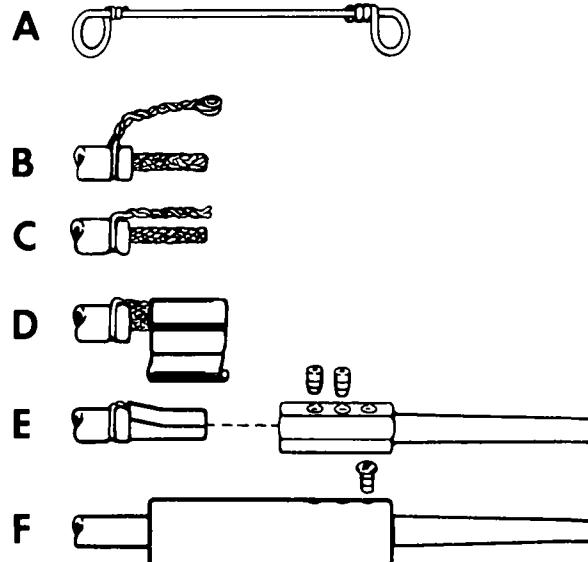
Figure 3-8. Work Clamp Installation

4. Bend the tabs on the end of the work clamp around the work cable.
5. Slide the insulating sleeve on the work cable over the work clamp handle.
6. Slide the remaining insulating sleeve over the other work clamp handle.

B. Jack Plug Installation (Figure 3-9)

The jack plug, included in the parts package, must be attached to the plain end of the work cable as follows:

1. Remove 1 in. (25.4 mm) of insulation from end of cable.



TA-901 024-4

Figure 3 - 9. Jack Plug Installation

2. Clamp cable in a vise with uninsulated end extending upward out of vise approximately 1-3/4 in. (44.5 mm).
3. Place steel tie wire (item A) approximately 1/4 in. (6.4 mm) from end of insulation.
4. Make half turn around cable bringing looped ends of tie wire together.
5. Insert a 3/8 in. (9.5 mm) diameter rod through looped ends of tie wire.
6. Twist tie wire (B) until entire tie wire is twisted and is tight and around insulation of cable.
7. Clip off looped ends of tie wire.
8. Bend the twisted tie wire over and along the side (C) of uninsulated portion of cable.
9. Wrap the strip of copper foil tightly around uninsulated end of cable and twisted tie wire (D).
10. Push the jack plug onto cable over copper foil (E).
11. Insert the 1/4-20 setscrews into the center and bottom holes in jack plug and tighten (E).
12. Remove cable from vise and insert jack plug into insulating sleeve. Slide insulating sleeve over jack plug and cable until hole in insulating sleeve lines up with remaining hole in jack plug (F).
13. Insert the 8-32 self-tapping screw (F) through hole in insulating sleeve into jack plug and tighten.
14. Insert jack plug into the NEGATIVE weld output receptacle on front panel of the welding power source.

3 - 6. INSTALLATION OF WELDING WIRE SPOOL (Figure 3-10)

1. Open hinged door panel on left side of welding power source by turning the two wing-headed screw fasteners in a counterclockwise direction.
2. Remove all packing from spool of wire.
3. Remove retaining ring by pressing the two spring loaded pins inward. Remove compression spring from the welding power source wire spool hub.
4. Place wire spool onto the wire spool hub so that wire feeds from the bottom of the spool into the inlet wire guide as shown in Figure 3-10. Ensure that small pin of the spool hub fits into the small hole of the wire spool.
5. Replace retaining ring on the hub. Compression spring not required for 12 in. spools. For 8 in. spools, use compression spring.

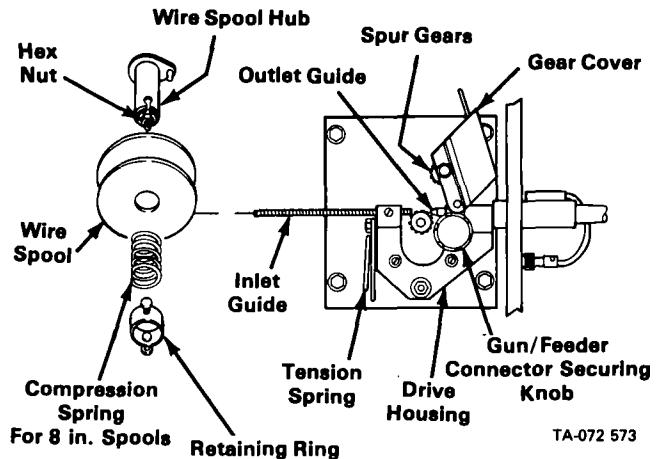


Figure 3-10. Wire Spool Installation And Welding Wire Threading

3 - 7. THREADING THE WELDING WIRE (Figure 3-10)

WARNING: ELECTRIC SHOCK can kill; WELDING WIRE can cause puncture wounds; MOVING PARTS can cause injury.

- Do not touch live electrical parts.
- Do not point gun toward any part of the body, other personnel, or any conductive surface when threading welding wire.
- Keep clear of pinch points.

The welding wire and all metal parts in contact with it are energized when the gun trigger is pressed.

1. Disengage tension spring on drive assembly and pivot the gear cover open as shown in Figure 3-10.

IMPORTANT: Spooled wire has a tendency to unravel when loosened from the spool. Maintain a firm grip on the wire during the threading operation.

2. Loosen end of wire from spool and cut off any kinked or bent portion with side cutters. The cut must be a good clean cut to avoid binding in the drive system.
3. Thread wire through the inlet guide, over the drive roll, and approximately 4 inches (102 mm) into the outlet guide.

IMPORTANT: Whenever the upper portion of the drive assembly is closed, ensure that gears are properly meshed and the wire is placed in the groove of the drive rolls. Failure to comply with this requirement will result in erratic wire feed and damage to the drive rolls.

4. Lower gear cover making sure that the gears are properly meshed, and that the wire is placed in the groove of the drive roll. Reposition tension spring into locked position.
5. Turn Line Disconnect Switch and welding power source POWER switch to the ON position.

If welding power source has spot welding capabilities, place SELECTOR SWITCH in the CONTINUOUS WELDING position.

WARNING: ELECTRIC SHOCK can kill; WELDING WIRE can cause puncture wounds; MOVING PARTS can cause injury.

- Do not touch live electrical parts.
- Do not point gun toward any part of the body, other personnel, or any conductive surface when threading welding wire.
- Keep clear of pinch points.

The welding wire and all metal parts in contact with it are energized when the gun trigger is pressed.

6. Press gun trigger and hold in until the wire extends about 1/4 in. (6 mm) out of the contact tube.
7. Set proper hub tension by adjusting the hex nut (see Figure 3-10). Wire should unwind freely, but tension should be sufficient to keep the wire taut and prevent backlash when the gun trigger is released.
8. Close hinged door panel on welding power source and secure with screw fasteners.
9. If excess wire feeds out, cut off to 1/4 in. (6 mm) length with side cutters.

3 - 8. MWG 200 WELDING GUN CONNECTIONS

A. Gun/Feeder Connector Installation (Figure 3-11)

1. Loosen the gun/feeder connector securing knob.

IMPORTANT: Wire guides should be installed so that the tip of the guide is as close to the drive roll as possible without touching.

2. Insert the gun/feeder connector, which includes the installed outlet guide, through the access hole in the wire feeder and into the drive assembly as illustrated in Figure 3-11, Photo A.
3. Tighten the gun/feeder connector securing knob as illustrated in Figure 3-11, Photo B.

B. Gun Switch Connection (Figure 3-11, Photo C)

A Gun Trigger receptacle is provided for making gun switch control connections. Align the keyways on the gun switch plug with the Gun Trigger receptacle keys, insert the plug, and rotate threaded collar clockwise as illustrated in Figure 3-11, Photo C. When the gun switch is closed, the contactor in the welding power source energizes, shielding gas flows, and wire feeds.

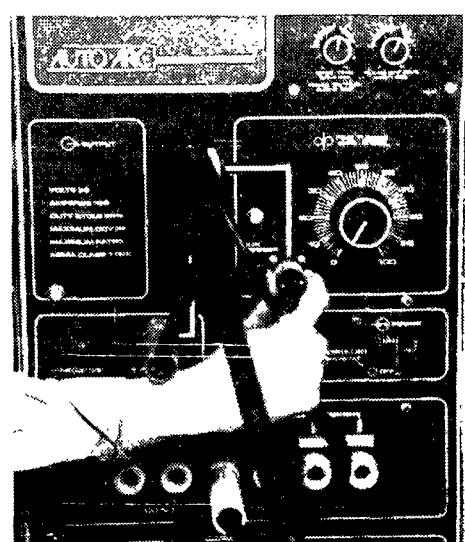
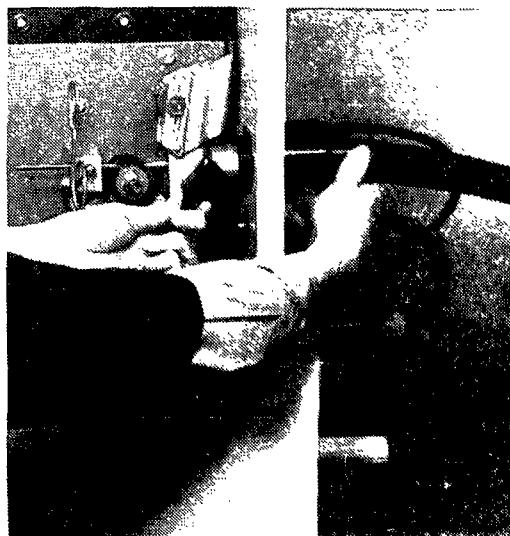


Figure 3-11. Welding Gun Connections

3 - 9. INSTALLATION OF SHIELDING GAS

A. Gas Cylinder

Secure the gas cylinder to the running gear with supplied chain. If running gear is not to be used, chain cylinder to a wall or other stationary support to prevent cylinder from falling over and breaking off the valve.

WARNING: GAS UNDER PRESSURE is explosive.

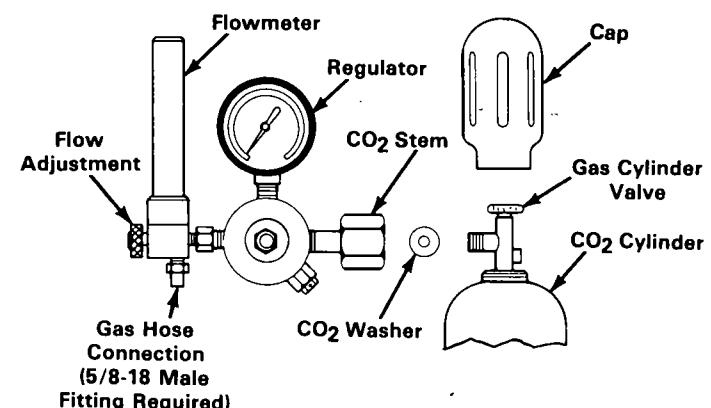
- Keep open flame and smoking materials away from shielding gas.
- Always store cylinders in upright position.
- Ensure that cylinders are chained to stationary support or running gear

B. Regulator/Flowmeter

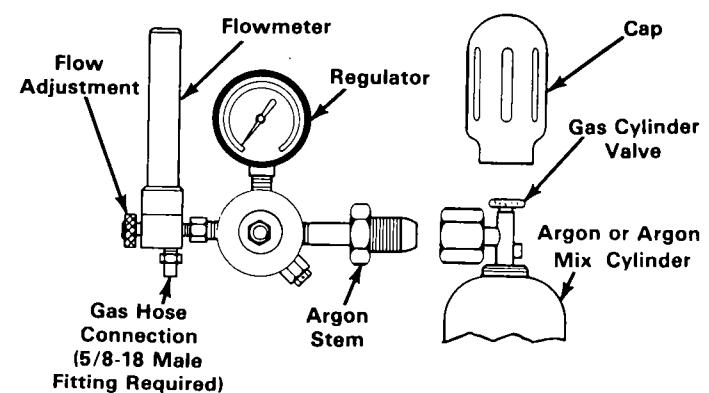
1. With the cylinder correctly placed, remove cylinder cap, then stand to one side of the cylinder valve and open valve slightly. When gas is emitted from the cylinder, close the valve. This procedure will help to get rid of any dust that may have accumulated around the valve seat.
2. Regulator/flowmeter must be properly equipped with a stem, nut connectors, and gasket for use with either CO₂ cylinders or Argon/CO₂ cylinders.
3. Attach gas regulator to gas cylinder valve; keep the face of the regulator/flowmeter gauge in a vertical position and tighten stem nut securely to gas cylinder valve.

IMPORTANT: A gasket should be installed to prevent leaks. Do not use lubricants or sealing agents.

4. A shielding gas output fitting is provided at the rear of the welding power source for making gas connections. Attach one end of the gas hose to this output fitting. Attach other end of the gas hose to the regulator/flowmeter.



CO₂ Installation

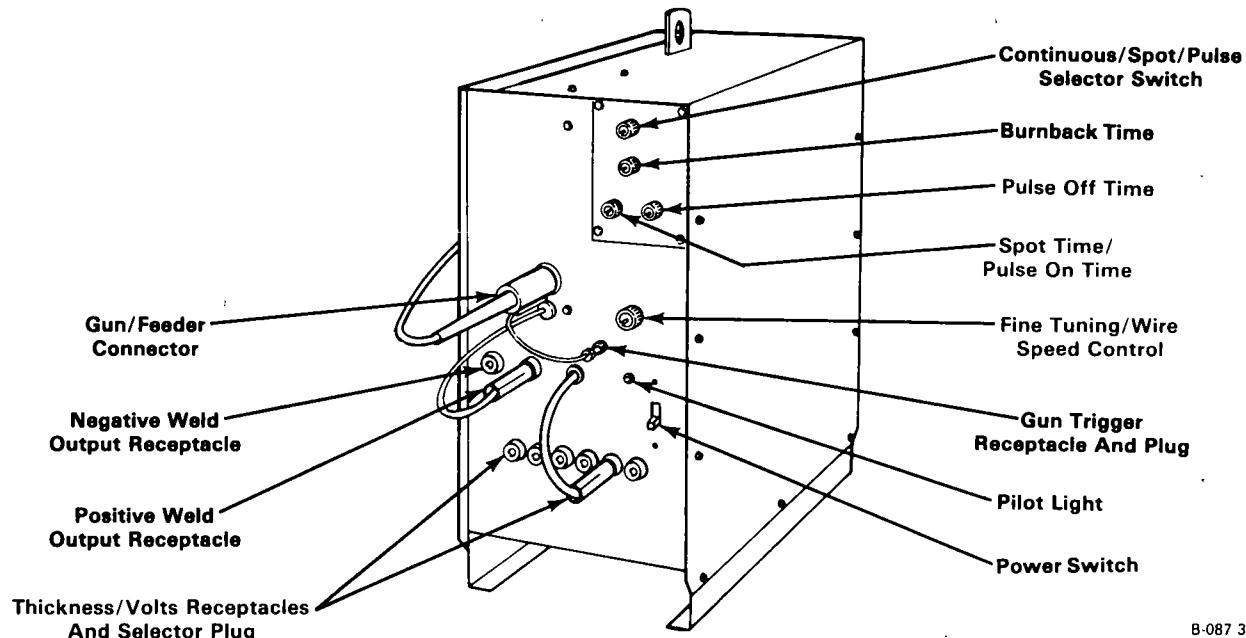


Argon Installation

TB-109 492

Figure 3-12. Typical Regulator/Flowmeter Installation

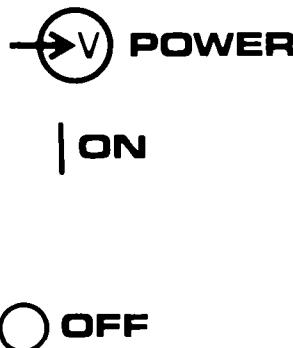
SECTION 3 - OPERATOR CONTROLS



B-087 313-B

Figure 4-1. Front Panel View

4 - 1. POWER SWITCH (Figure 4-1)



IMPORTANT: When the POWER switch is placed in the ON position, the pilot light will turn on but the fan motor will not start running unless the internal components are already warm. The fan motor is thermostatically controlled and will only operate when additional cooling is required (see Section 4-6).

Placing the POWER switch in the ON position will energize the welding power source and place the unit in a ready-to-weld status. Placing the POWER switch in the OFF position will shut the unit down.

4 - 2. PILOT LIGHT (Figure 4-1) - A Pilot light is provided to indicate when the welding power source is energized and in a ready-to-weld status. The Pilot light illuminates whenever the POWER switch is in the ON position and weld output is available. If the unit shuts down because of overtemperature the pilot light goes out.

4 - 3. THICKNESS/VOLTS SELECTOR (Figure 4-1)

THICKNESS
VOLTS

The THICKNESS/VOLTS selector jack plug and receptacles provide a selection of heat input to the weld from 1 through 6. The higher the numbered tap the hotter the weld.

WARNING: ELECTRIC SHOCK can kill; ARCING can burn skin or damage electrical connections.

- Do not touch live electrical parts.
- Do not change position of THICKNESS/VOLTS selector jack plug while welding.
- Be sure that jack plug is secure in receptacle before welding.

4 - 4. FINE TUNING/WIRE SPEED CONTROL (Figure 4-1)

FINE TUNING
WIRE SPEED

The FINE TUNING/WIRE SPEED control provides a means of varying both the speed of the wire feed motor and weld current of each THICKNESS/VOLTS tap.

Rotating the FINE TUNING/WIRE SPEED control clockwise increases the rate of the wire feed and weld current within the range of the selected THICKNESS/VOLTS tap.

When the FINE TUNING/WIRE SPEED control is set at 0, wire feeds at the slowest speed and weld current is at minimum in the selected range; when set at 100, the wire feeds at the fastest speed and weld current is at maximum in that range.

The scale which surrounds the FINE TUNING/WIRE SPEED control is calibrated in increments of ten ranging from 0 to 100 percent. Due to this percentage calibration, it should be noted that if this scale is being used to select a wire feed speed and weld current, only a percentage of the range in use is being selected and not an actual wire feed speed or amperage.

4 - 5. OPTIONAL SPOT PULSE WELD PANEL CONTROLS (Figure 4-1)

IMPORTANT: In the PULSE mode, the FINE TUNING/WIRE SPEED control must be set at 50 percent or less when using THICKNESS/VOLTS taps 5 and 6.

A. Selector Switch

The Selector switch enables the operator to select continuous, spot, or pulsed wire feed operation. Placing the Selector switch in the CONTINUOUS position and depressing the gun trigger feeds welding wire for as long as the gun trigger remains closed. Placing the Selector switch in the SPOT position and depressing the gun trigger feeds welding wire for the length of time set on the SPOT TIME control. Placing the Selector switch in the PULSE position and depressing the gun trigger feeds welding wire for the length of time set on the PULSE ON TIME control. At the end of pulse on time, welding wire feeding stops for the length of time set on the PULSE OFF TIME control. Welding wire feeding continues to pulse on and off for the selected times until the gun trigger is released.

The pulse option provides better control of the heat input to the weld on thin gauge metals, thereby decreasing distortion and the likelihood of melt-throughs.

B. Spot Time/Pulse On Time Control

The SPOT TIME/PULSE ON TIME control enables the operator to select from 0.5 to 4 seconds of weld time for spot operation or 0.25 to 2 seconds of pulse time for pulse operation. Rotating the control clockwise increases spot/pulse on time. The control scale is calibrated in percent and does not indicate actual spot/pulse on times.

C. Pulse Off Time Control

The PULSE OFF TIME control enables the operator to select from 0.25 to 1 second of pulse off time for pulse operation. Rotating the control clockwise increases pulse off time. The control scale is calibrated in percent and does not indicate actual pulse off time.

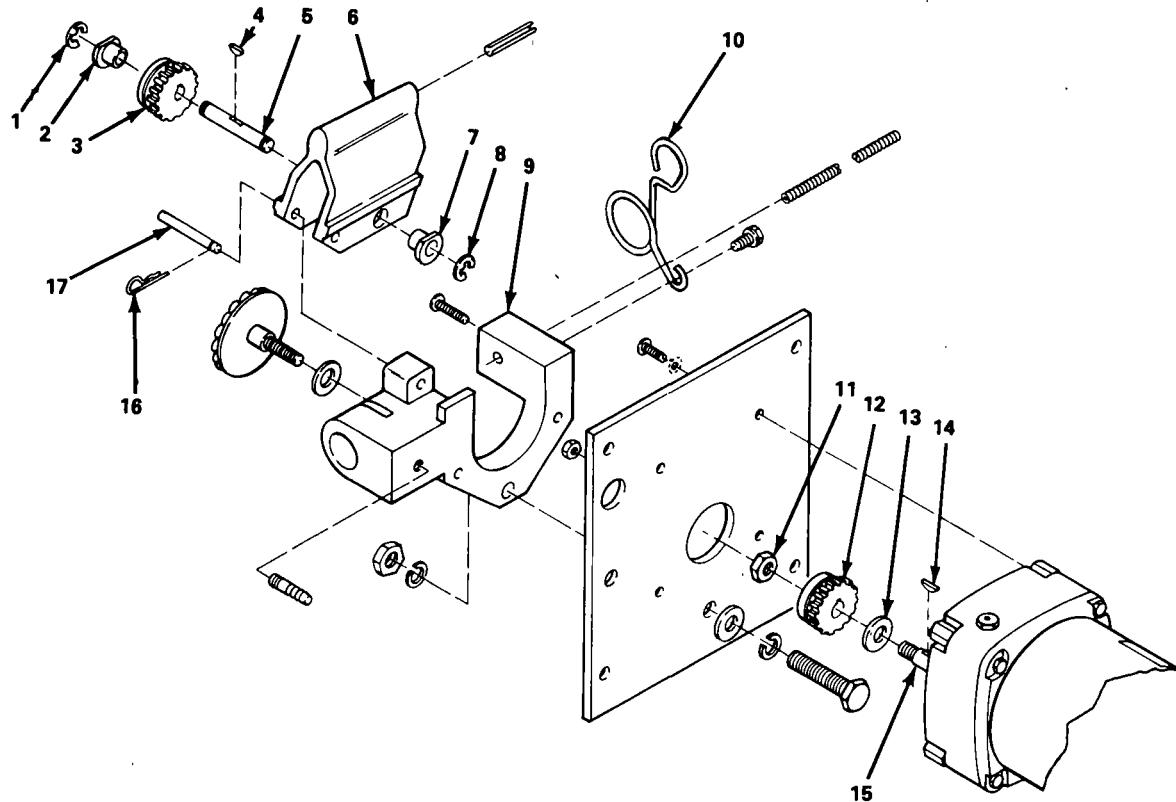
D. Burnback Time Control

The BURNBACK TIME control enables the operator to select the amount of time the electrode wire remains electrically hot after the wire stops feeding. The correct burnback time allows the wire to burn back just free of the weld puddle. If the burnback time is too long the wire could burn back into the contact tube.

Rotating the BURNBACK TIME control clockwise increases burnback time from 0 to 0.25 seconds. The control scale is calibrated in percent and does not indicate actual burnback times.

4 - 6. FAN-ON-DEMAND - Fan motor FM is thermostatically controlled to provide fan cooling of main transformer T1 and rectifier assembly SR1 if these components require cooling. The fan will only run when cooling is required. Two normally-open thermostats, TP1 in rectifier assembly SR1 and TP2 in main transformer T1, and relay CR2, regulate the operation of fan motor FM. When the main transformer and/or rectifier assembly warm up enough to close thermostat(s) TP1 and/or TP2, fan relay CR2 energizes causing fan motor FM to start running. The fan motor will continue to operate until the main transformer and/or rectifier assembly have cooled enough to permit thermostats TP1 and TP2 to open or until the welding power source is shut down.

SECTION 5 - MAINTENANCE & TROUBLESHOOTING



TC-072511

Figure 5-1. Drive Roll Gear Removal And Installation

WARNING : ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Disconnect unit from input power before internally inspecting or servicing.*

MOVING PARTS can cause serious injury.

- *Keep clear of moving parts.*

HOT SURFACES can cause severe burns.

- *Allow cooling period before servicing.*

Troubleshooting of internal parts to be performed only by qualified persons.

IMPORTANT : *Periodically inspect the labels on the unit for legibility. All precautionary labels must be maintained in a clearly readable state and replaced when necessary. See Parts List for part number of precautionary labels.*

5 - 1. TRANSFORMER - Occasionally blow out the dust and dirt from around the transformer. Do this periodically, depending upon the location of the unit and the amount of dust and dirt in the atmosphere. Use a clean, dry air source for this cleaning operation.

5 - 2. FAN MOTOR - All models are equipped with an exhaust fan and rely on forced draft for adequate cooling. The fan motor bearings require no periodic maintenance.

5 - 3. REMOVAL OF DRIVE ROLL GEARS (Figure 5-1)

A. Removal Of Upper Drive Roll Gear

1. Grasp tension spring (10) at the top and pull outward until it disengages from cover (6).
2. Remove pin (16) from the back side of shaft (17).
3. Pull out shaft (5) from drive roll cover (6) and lift off drive roll cover (6).
4. Pull off snap rings (1 and 8) from shaft (5).
5. Pull out bearing (2) from drive roll cover (6).
6. Slide shaft (5) out of drive roll cover (6) until drive roll gear (3) drops out.
7. Ensure that key (4) remains in the slot in shaft (5).

B. Removal Of Lower Drive Roll Gear

1. Remove nut (11) from drive shaft (15).
2. Slide drive roll gear (12) off of drive shaft (15).
3. Ensure that key (14) remains in the slot in drive shaft (15).

C. Installation

Reverse the preceding procedures to install the drive roll gears.

5 - 4. CLEANING OF DRIVE ROLLS - Occasionally it will become necessary to clean the wire groove on the drive rolls. This cleaning operation can be performed with a wire brush.

WARNING: HIGH ROTATIONAL SPEED may cause damage to drive rolls.

- *Do not allow drive rolls to rotate at high speed if compressed air is used for cleaning the drive roll assembly.*

5 - 5. CIRCUIT BREAKERS - Two circuit breakers, located immediately above the drive roll assembly, are provided to protect the welding power source in the event of an overload. Circuit breaker CB1 protects the motor armature and circuit breaker CB2 protects the welding power source control circuitry. If either circuit breaker opens, wire feeding ceases. It would then be necessary to manually depress the appropriate circuit breaker to reset it.

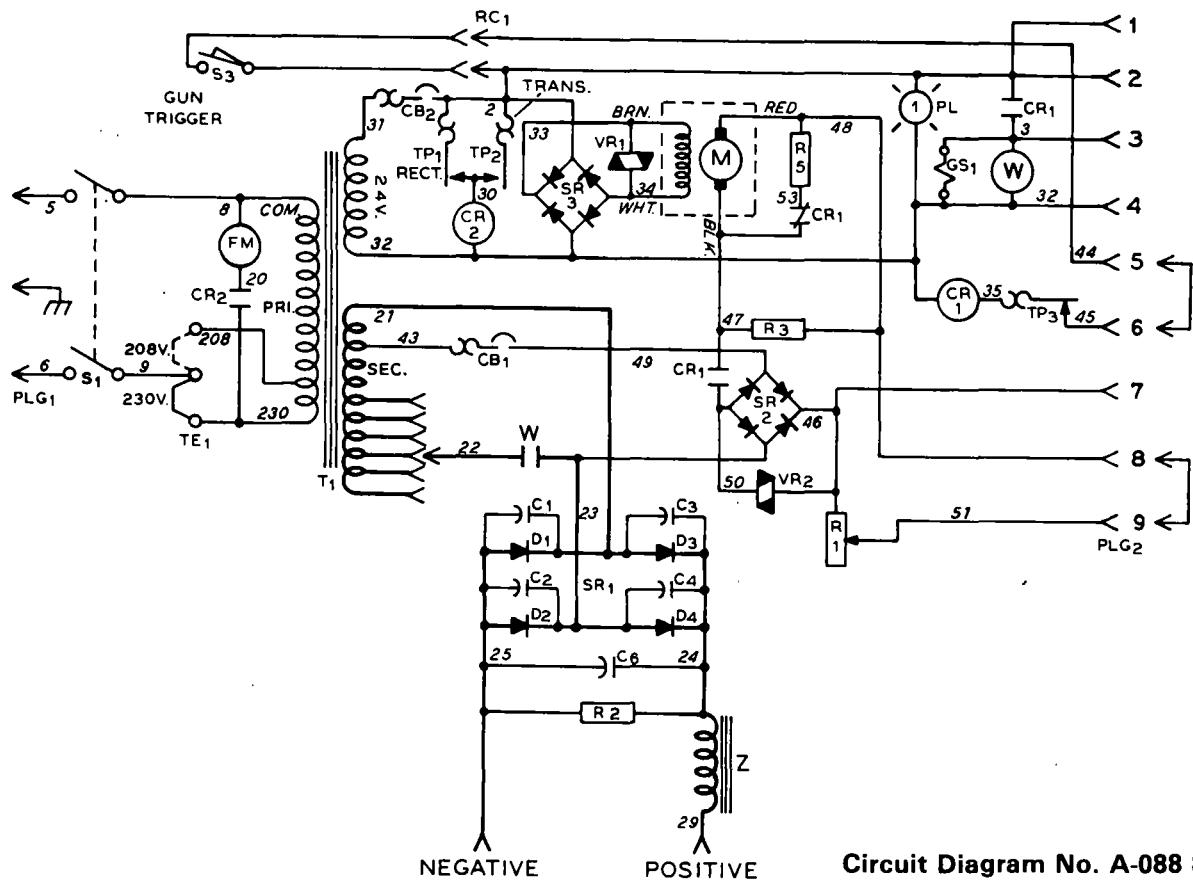
5 - 6. TROUBLESHOOTING - The following chart is designed to diagnose and provide remedies for some of the troubles that may develop in this welding power source and wire feeder.

When troubleshooting this welding power source, always start with the simplest problem and advance to the more complicated. Use the senses of feeling, hearing, seeing, and smelling. Apply common sense; then try to locate the trouble through a process of elimination.

Use this chart in conjunction with the circuit diagram while performing troubleshooting procedures. If the trouble is not remedied after performing these procedures, the nearest Factory Authorized Service Station should be contacted. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly followed.

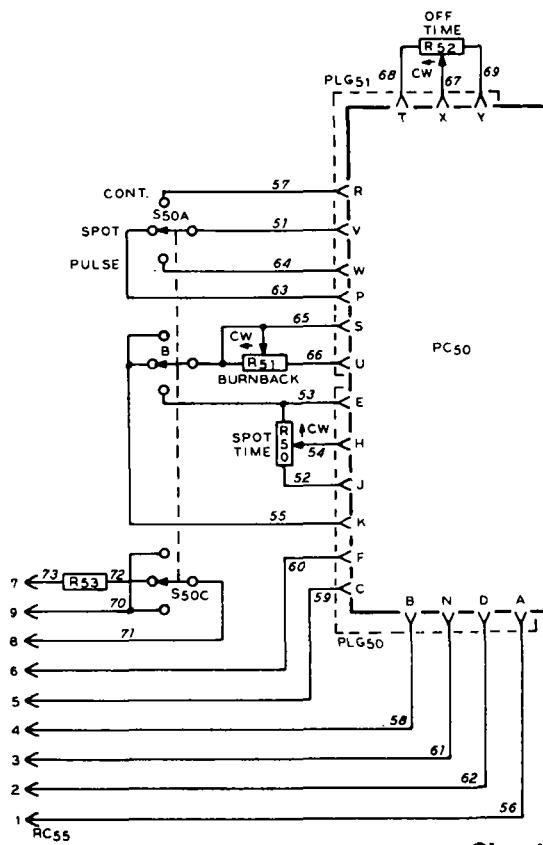
TROUBLE	PROBABLE CAUSE	REMEDY
Electrode wire stops feeding while welding.	Sharp or excessive bend in gun cables or liners.	Straighten gun cables and/or replace liners.
	Drive roll pressure not applied.	Apply drive roll pressure.
	Spindle friction too great.	Loosen and re-adjust nut pressure.
	Contact tip orifice restricted; burnback of electrode.	Replace contact tube.
	Friction in gun.	Check wire passage; clean, replace parts as required.
	Gun casing liner dirty, restricted.	Remove liner, blow out with compressed air.
	Broken or damaged casing or liner.	Replace casing or liner as required.
	Drive rolls worn; slipping.	Replace drive rolls.
	Drive motor burned out.	Test motor; replace if necessary.
	Gun trigger switch inoperative or wire leads broken.	Replace switch; check connections.
	Fuse blown in power source primary.	Replace fuse.
	Welding contactor open.	Check for 115V applied to contactor.
	Circuit breaker of contactor circuit opened.	Reset circuit breaker.
	Protective circuit breaker in wire drive motor circuit opened.	Find cause of overload and reset circuit breaker.
Electrode wire feeds but is not energized. No welding arc.	Excessive loading of drive motor.	Clear restriction in drive assembly.
	Wire drive rolls misaligned.	Re-align drive rolls.
	Wire control/feeder relay inoperative.	Replace control relay.
	Work connection loose or incomplete due to rust, paint, etc.	Make sure the work clamp makes good metal to metal contact with the workpiece. Make the work clamp connection as close to the weld area as possible.
	Welding cables loose in plugs.	Check connections.
	Contact tube.	Replace contact tube.

TROUBLE	PROBABLE CAUSE	REMEDY
Low output.	Primary jumper link in wrong position.	Place jumper link in position for primary voltage being used. See Section 3-3B.
	Low primary voltage.	Connect welding power source to proper primary input voltage.
Unit shuts down while welding.	Fan motor inoperative or fan motor connections loose.	Check and repair fan motor connections. Replace fan motor.
	Fan control circuit.	Replace inoperative components in fan control circuitry: relay CR2, thermostat TP1 or TP2.
No output.	POWER switch S1.	Replace S1.
	Line fuse open.	Check and replace line fuses if necessary.
	Loose primary connections.	Check tightness of all primary connections.
	Primary disconnect switch or line circuit breaker open.	Place primary disconnect switch or line circuit breaker in closed position.
No open-circuit voltage.	Contactor points.	Replace points.
	Contactor W coil.	Replace coil.
	Gun switch S3.	Replace S3.
	THICKNESS/VOLTS selector plug not secure in receptacle.	Secure plug into receptacle.
	Transformer T1.	Replace T1.
	Plug PLG2 not secure in receptacle RC2 (Spot Pulse Weld Models Only).	Secure PLG2 into RC2.
Wire does not feed. Open-circuit voltage is normal.	Circuit breaker CB1 or CB2 tripped or inoperative.	Reset or replace CB1 or CB2.
	FINE TUNING/WIRE SPEED control R50 open.	Replace rheostat R50.
	Rectifier SR2.	Replace SR2.
	Wire feed motor M.	Replace motor M.
Spot Weld Timer and Spot Burnback Timer inoperative. Wire feeds continuously. Output normal (Spot Pulse Weld Models Only).	Spot Pulse Weld panel inoperative.	Replace Spot Pulse Weld panel.



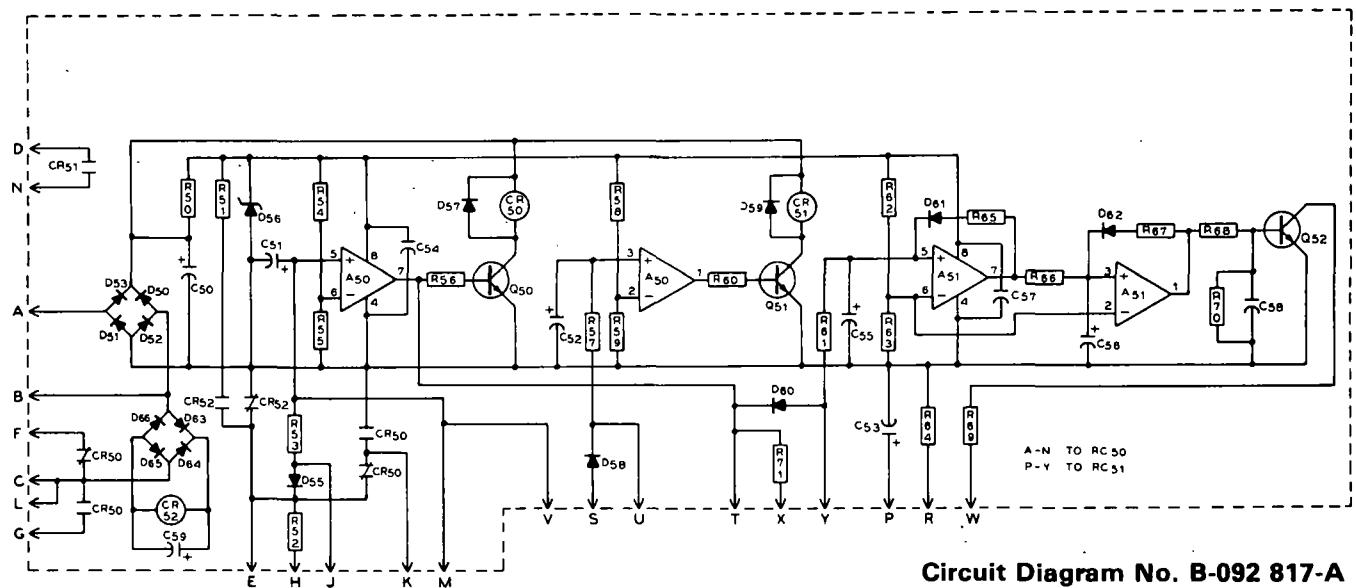
Circuit Diagram No. A-088 808-A

Figure 5-2. Circuit Diagram For Welding Power Source



Circuit Diagram No. A-090 568-A

Figure 5 - 3. Circuit Diagram For SPW 1 Panel



Circuit Diagram No. B-092 817-A

Figure 5 - 4. Circuit Diagram For SPW 1 Panel Printed Circuit Board PC50

SECTION 6 - WELDING PARAMETERS, TECHNIQUES AND SET-UP

CAUTION: WELDING CURRENT can damage automotive electronic parts.

- *Disconnect both battery cables before welding on a vehicle.*

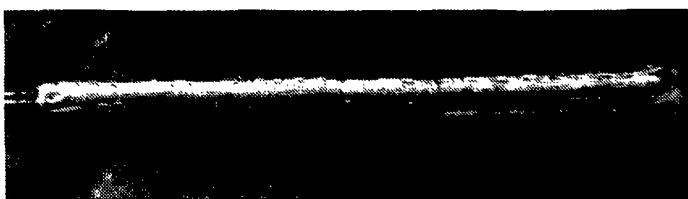


Figure 6-1. Continuous Seam

The ability to produce a good bead while using the Continuous Seam Gas Metal Arc process is dependent on several factors. One of the most important, after wire and shielding gas selection, is the way the gun is held. Cradle the gun in one hand and rest the side of the hand on the workpiece (avoid doing this on hot material); use other hand to hold gun and control the gun trigger. Position the gun either toward or away from the body at a 45 to 60 degree lead angle (see Figure 6-2). This will give a good view of the arc and make it easier to follow the seam while wearing a welding helmet. Maintain a 1/4 to 5/16 inch (6-8 mm) distance from the bottom of the gun nozzle to the workpiece during the arc starting and welding period. Do not pull the gun back from the seam when the arc starts, as this will create a long wire extension and result in a poor weld.

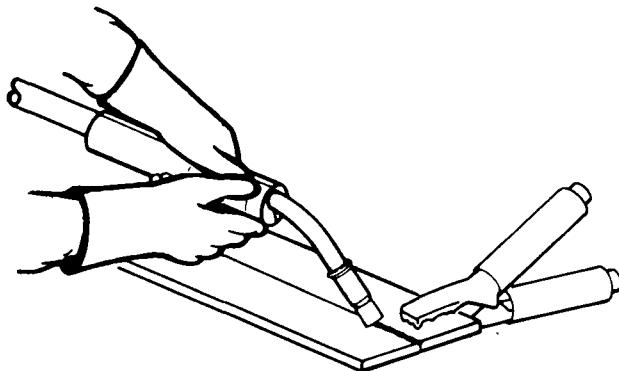


Figure 6-2. Gun Position

The welding wire is not energized until the trigger is pressed. Therefore the welding wire can be extended 1/4 (6 mm) inch beyond the gun nozzle and placed on the seam before lowering the helmet and pressing the gun trigger.

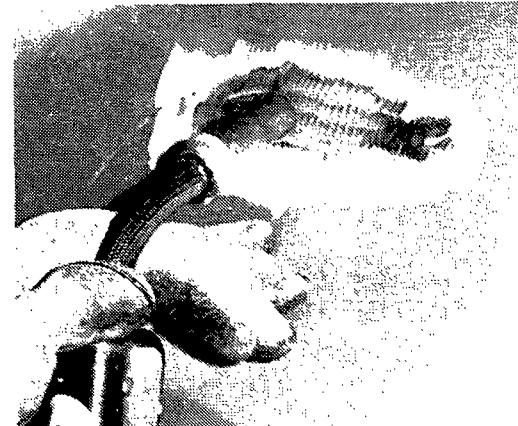
The gun can be moved along the seam in a steady movement known as the drag technique (see Figure 6-3), or it can be oscillated a few degrees beyond each side of the seam. The travel speed will be regulated by the type of weld bead required, the thickness of the material, welding current selected and the technique used. However, the average speed is 15 to 20 inches per minute (.4-.5 mph).



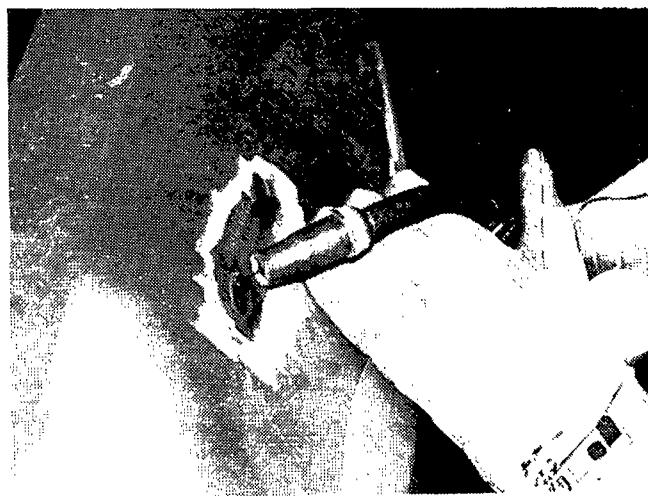
TA-057 469-16

Figure 6-3. Welding Techniques

Other welding techniques that affect the weld characteristics in the MIG welding process include the backhand and forehand technique, and the vertical up and vertical down positions. In the backhand technique the gun is positioned so that the electrode wire is feeding in the opposite direction of arc travel. The filler metal is being fed into the weld metal previously deposited. In the forehand technique the gun is angled so that the electrode wire is fed in the same direction as the arc travel. The backhand technique generally yields a more stable arc and less spatter on the workpiece.



Direction of Arc Travel
Backhand Technique



Direction of Arc Travel
Forehand Technique

Figure 6-4. Longitudinal Gun Positions

The vertical up and/or vertical down techniques describe the direction of arc travel when the welding must be done in the vertical position. In both of these techniques gun positioning is extremely important because the arc must be kept on the leading edge of the puddle to ensure complete weld penetration. The drag technique is generally employed when welding in the vertical position, but when bridging a gap, the arc can be oscillated from one side of the work to the other.



Vertical Up



Vertical Down

Figure 6-5. Welding In the Vertical Up and Vertical Down Position

6 - 2. SET-UP FOR CONTINUOUS GAS METAL-ARC WELDING

Table 6-1. Range Selection Chart For Mild Steel

THICKNESS/VOLTS Tap	1	2	3	4	5	6
METAL GAUGES	22-18	18-16	16-14	14-12	12-10	10 Or Heavier
THICKNESS INCHES	.035 +	.047 +	.059 +	.067 +	.104 +	.134 +
THICKNESS MILLIMETERS	.8 +	1.2 +	1.5 +	1.9 +	2.6 +	3.4 +
AMPERAGE * .030" (.8mm) WIRE	30-55	55-85	85-105	105-130	130-150	150-180
AMPERAGE * .035" (.9mm) WIRE	35-65	65-95	95-115	115-140	140-180	175-220

*Amperage ranges are obtained by adjusting the FINE TUNING/WIRE SPEED control.

WARNING : ELECTRIC SHOCK can kill; MOVING PARTS can cause serious injury; OVERHEATING AND EXPOSURE TO ENVIRONMENT can damage internal parts.

- Do not touch live electrical parts.
- Keep all covers and panels in place while operating.

Warranty is void if the welding power source is operated with any portion of the outer enclosure removed.

WELDING CURRENT can damage automotive electronic parts.

- Disconnect both battery cables before welding on a vehicle.

1. Thoroughly clean the joint area of the base metal with sandpaper or wire brush.

2. Ensure that the regulator flowmeter adjustment handle is in the closed (clockwise) position, then slowly turn the gas cylinder valve (counterclockwise) until it is completely open.

3. Place the Line Disconnect Switch in the On position.

WARNING : ELECTRIC SHOCK can kill; ARCING can burn skin or damage electrical connections.

- Do not touch live electrical parts.
- Do not change position of THICKNESS/VOLTS selector jack plug while welding.
- Be sure that jack plug is secure in receptacle before welding.

4. Place the THICKNESS/VOLTS selector jack plug in the desired receptacle.

5. Rotate the FINE TUNING/WIRE SPEED control to the desired setting.

6. Connect the work clamp to the work material as close to the weld area as possible.

7. Place the welding power source POWER switch in the ON position.

8. If the welding power source has been idle for any length of time, air will begin to displace the shielding gas in the gas hose between the gas valve and the gun. To avoid contaminating the weld, release drive roll pressure and depress the gun trigger for approximately fifteen seconds to purge the gas hose and to adjust the regulator flowmeter. Retighten drive rolls.

IMPORTANT : Gas pressure of 6 pounds or flow rate of 15 cfh are typical. Welding out of position, welding at fast travel speed or at high wire feed speeds, or welding in a drafty environment will require more gas shielding.

WARNING : ELECTRIC SHOCK can kill; ARC RAYS can burn eyes.

- Do not touch live electrical parts.
- Keep the welding wire isolated from the work clamp or any conductive surface when not welding.

The welding wire is electrically energized whenever the gun trigger is depressed. The difference in potential between the welding wire and the work clamp (workpiece or table if workclamp is connected to either) will cause current to flow if contact is made.

9. Extend the welding wire 1/4 inch (6 mm) beyond gun nozzle.

WARNING: ARC RAYS, SPARKS, AND HOT SURFACES can burn eyes and skin; NOISE can damage hearing.

● *Wear correct eye, ear, and body protection.*
See Section 1-Safety Rules For Operation Of Arc Welding Power Sources for basic welding safety information.

10. Place wire over seam.
11. Be sure to hold gun nozzle 1/4 inch to 5/16 inches, (6 to 8 mm) from workpiece.

12. Lower welding helmet, press trigger, and begin welding.

6 - 3. PULSED GAS METAL ARC WELDING

In pulsed welding the filler metal is transferred to the work during the period of Pulse On Time, and cools during the period of Pulse Off Time. When the selector switch is placed in the PULSE position and the gun trigger is depressed, the welding wire feeds through the gun for the length of time set on the SPOT TIME/PULSE ON TIME control. At the end of the pulse on time the welding wire stops feeding for the length of time set on the PULSE OFF TIME control. This on and off sequence continues until the gun trigger is released. The pulse option provides better control of the heat input to the weld on thin gauge metals, thereby decreasing distortion and the likelihood of burn throughs.

Set-up procedures for pulsed seam welding are the same as those for continuous seam welding except that the Selector Switch is placed in the PULSE position and



Figure 6-6. Pulsed Seam

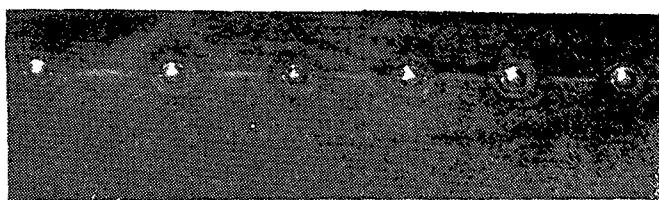


Figure 6-7. Spot Weld

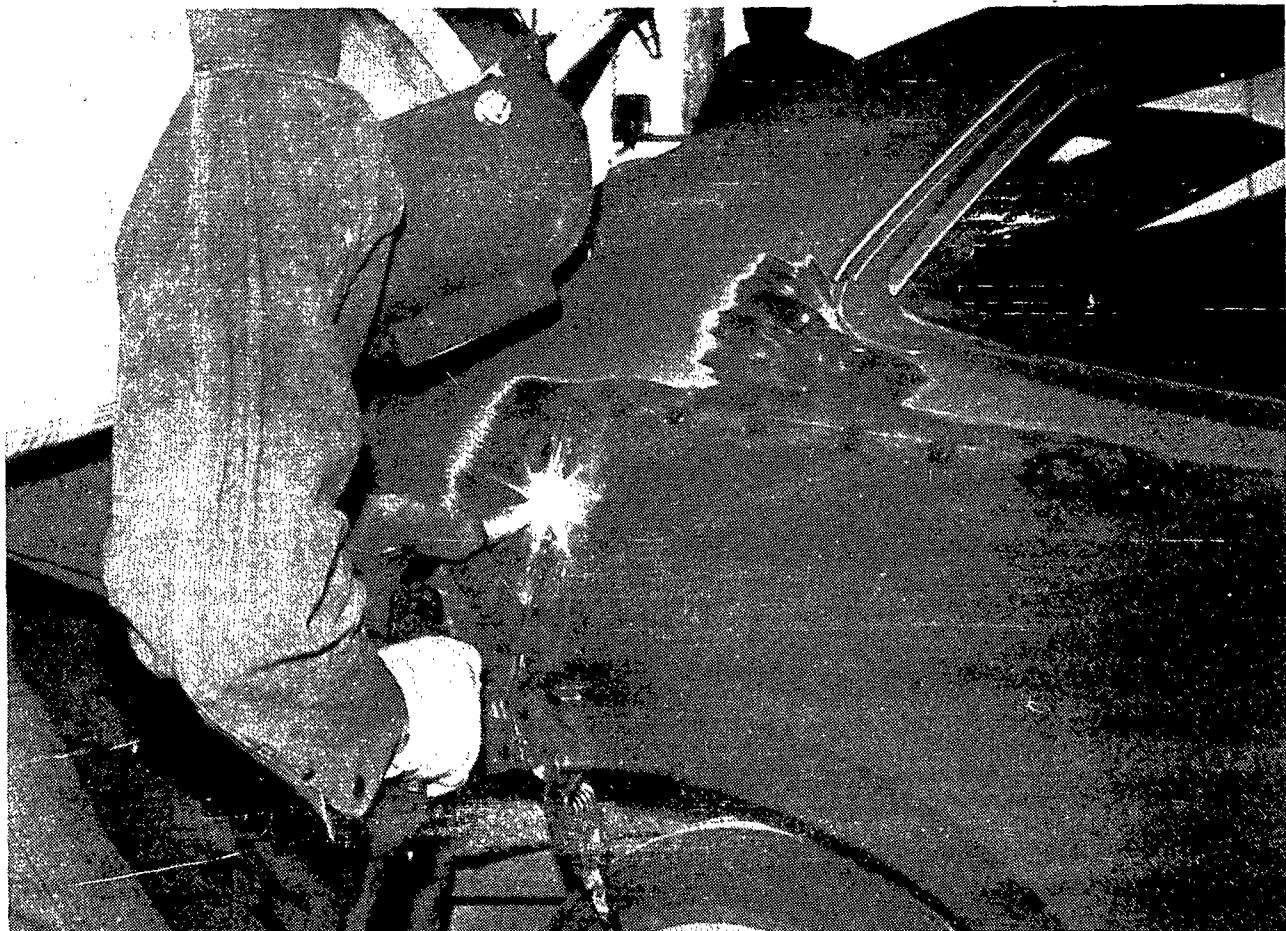


Figure 6-8. Fender Repair With Spot Nozzle

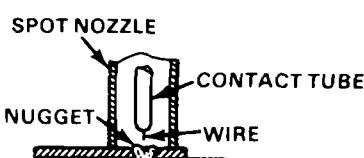
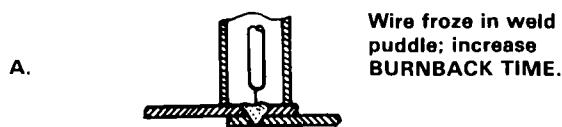
the SPOT TIME/PULSE ON TIME control and PULSE OFF TIME controls must be set to the desired positions.

6 - 4. SPOT WELDING

Instead of having a continuous or pulsed weld to join two pieces of sheet steel together, welding in spots of 1 to 1 1/2 inches (25 to 38 mm) apart can be done. The MIG spot welding process fuses two pieces of sheet steel together by penetrating entirely through one of the pieces into the other. The spot process is designed to be used in any position. Little joint preparation is required other than cleaning the surfaces and ensuring that the two pieces overlap.

Spot welding is based on the same principles as continuous seam welding except that there is no travel speed involved; instead, there is a welding time interval. The weld is made by placing the welding gun directly on the top sheet and holding it motionless as shown in Figure 6-8. When the gun trigger is depressed, the electrode wire and shielding gas will be continuously fed. The arc will be maintained for the full length of time set on the SPOT TIME/PULSE ON TIME control and it will continue to penetrate in one place until the top sheet is welded with the bottom sheet. After the preset welding time has elapsed, the wire will stop feeding, the contactor will open and the arc will be broken.

The MIG spot welding process produces little heat, therefore little distortion results. Because of the low heat characteristics of this technique, it is often used when welds are made in close proximity to upholstery, rubber, or other flammable materials.



Correct Burnback Time Setting



Ref: TD-083 575

A. Not Enough Burnback Time

1. Briefly press gun trigger to release nozzle from workpiece.

2. Cut wire from weld.

3. Increase BURNBACK TIME setting.

4. Try another sample weld.

B. Too Much Burnback Time

1. Remove nozzle and replace contact tube.

2. Reinstall nozzle and thread wire out new contact tube.

3. Decrease BURNBACK TIME setting.

4. Try another sample weld.

6 - 5. PLUG WELDS - Plug welds provide a means of joining two pieces of metal where the thickness of the top sheet is beyond the normal range of the welding power source or where sheet metal sections are too thin to be spot welded or pulsed welded without producing distortion or burn throughs. The plug weld is made by drilling or punching a hole in the top sheet, clamping the metal sections tightly together, and filling the hole with a weldment. The plug weld can be timed using the spot timer or untimed. Plug welds should be spaced 1 to 1 1/2 inches (25 to 38 mm) apart.

Plug welds on sample materials should be made so that proper parameters can be set.

6 - 6. SKIP WELDING - Skip welding provides a means of making a series of short welds, usually less than 3/4 in. (18 mm) in length each, consistent in size and appearance. Skip welding can be accomplished with this unit by setting a spot weld time and jogging the gun trigger off and on again each time the spot timer times out.

Skip welds should be made on sample material so that proper parameters can be set.

6 - 7. WELD DEFECTS: CAUSES AND CORRECTIVE ACTIONS - The following is a partial list of some of the more common weld defects that may occur with the Gas Metal Arc Welding process:

A. Porosity

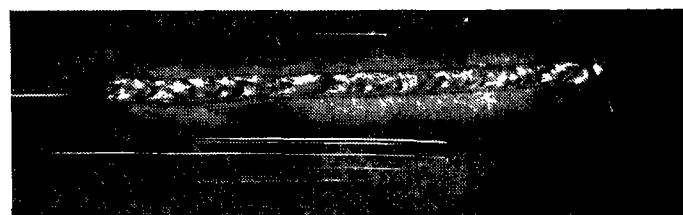


Figure 6-9. Porosity

Possible Causes	Corrective Actions
1. Inadequate shielding gas coverage.	Remove spatter from the gun nozzle.
	Check gas hoses for leaks.
	Eliminate drafts (from fans, open doors, etc.) blowing into the welding arc.
	Reduce nozzle-to-work distance.
	Increase gas flow to displace all air from the weld zone.
	Decrease excessive gas flow to avoid turbulence and the entrapment of air in the weld zone.
	Hold gun at end of weld until molten metal solidifies.
2. Gas contamination.	Check for frozen CO ₂ regulator flow meter.
3. Electrode contamination.	Use welding grade shielding gas.
4. Workpiece contamination.	Use only clean and dry electrode.
	Eliminate pick up of oil or lubricant on electrode in electrode feeder or conduit.
5. Excess tip-to-work distance.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
	Use a more highly deoxidizing electrode wire.
5. Excess tip-to-work distance.	Reduce stick-out.

B. Incomplete Fusion (Lack of fusion)

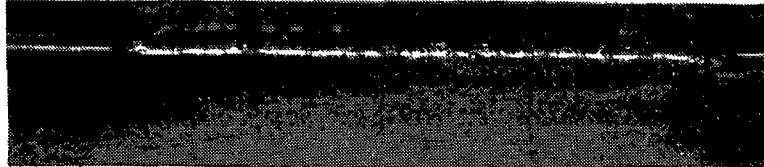


Figure 6-10. Incomplete Fusion

Possible Causes	Corrective Actions
1. Weld zone surfaces not free of film or excessive oxide.	Clean weld zone surfaces of impurities prior to welding.
2. Insufficient heat input.	Select higher THICKNESS/VOLTS tap.
3. Improper weld technique.	When using a weaving technique dwell momentarily on the side walls of the groove.
	Provide improved access at root of joints.
	Keep electrode directed at the leading edge of the puddle.
	Provide proper gun angle.
4. Improper joint design (Heavy material only: trailer hitches, etc.)	Provide included angle of groove joint large enough to allow access to bottom of the groove and sidewalls with proper electrode extension and arc characteristics, or use a "J" or "U" groove.

C. Lack Of Penetration

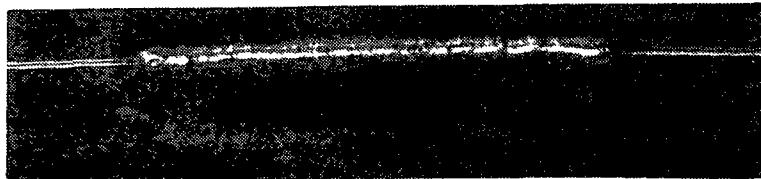


Figure 6-11. Lack Of Penetration

Possible Causes	Corrective Action
1. Improper joint preparation.	Material too thick. Joint preparation and design must be adequate to provide access to the bottom of the groove while maintaining proper electrode extension and arc characteristics.
	Reduce excessively large root face.
	Provide or increase the root gap in butt joints and increase the depth of back gauge.
2. Improper weld technique.	Maintain electrode angle normal to work surface to achieve maximum penetration.
	Keep arc on leading edge of the puddle.
3. Inadequate heat input.	Select higher THICKNESS/VOLTS tap.
	Reduce the travel speed.
	Maintain proper electrode extension.

D. Excessive Penetration (Burn-Through)



Figure 6-12. Excessive Penetration

Possible Causes	Corrective Actions
1. Excessive heat input.	Select lower THICKNESS/VOLTS tap.
	Increase travel speed.
2. Improper joint preparation.	Reduce joint opening or gap.

E. Cracks In Weld Metal

Possible Causes	Corrective Actions
1. Improper joint design (Heavy material).	Maintain proper groove dimensions to allow deposition of adequate filler metal to weld area.
2. Heat input too high causing excessive shrinkage and distortion.	Select lower THICKNESS/VOLTS tap.
	Increase travel speed.

F. Waviness of Bead

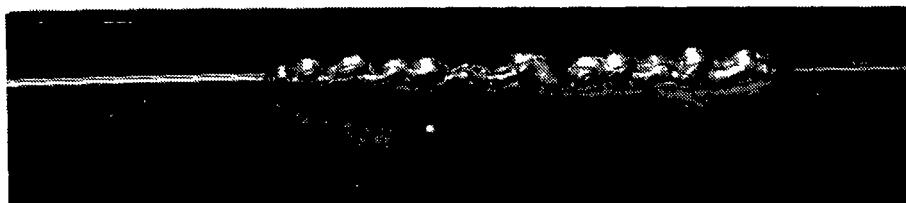


Figure 6-13. Waviness Of Bead

Possible Causes	Corrective Actions
1. Excessive electrode extension.	Reduce electrode extension.
2. Unsteady hand.	Support hand on solid surface.

G. Humping



Figure 6-14. Humping

Possible Causes	Corrective Actions
1. Too much heat input.	Select lower THICKNESS/VOLTS tap or increase travel speed.
	Weld in small segments and allow to cool between welds.

H. Excessive Spatter

Possible Causes	Corrective Actions
1. Excessive spatter when using CO ₂ shielding gas.	Select lower THICKNESS/VOLTS tap or adjust FINE TUNING/WIRE SPEED.

6 - 8. PROCEDURES FOR WELDING - Before using this equipment to weld on a finished piece of work, make a few practice welds on a sample piece of material the same as that of the finished workpiece. Whenever possible, weld in the flat position since this is the easiest position to learn. Be sure that the material to be welded is clean and free of paint and rust. The work cable clamp must be attached to the parts being welded. Clean surface to ensure proper grounding and to complete the current path.

6 - 9. PROCEDURES FOR WELDING DOOR PANELS

IMPORTANT: Every experienced autobody repairman will have his own method of performing the following procedures. However, this information is presented to show how, in most cases, this welding power source can make the job easier and less time consuming.

If the door is severely damaged, but the damage is primarily in the outer panel, or "skin", the door can be easily repaired without necessarily installing a whole new door.

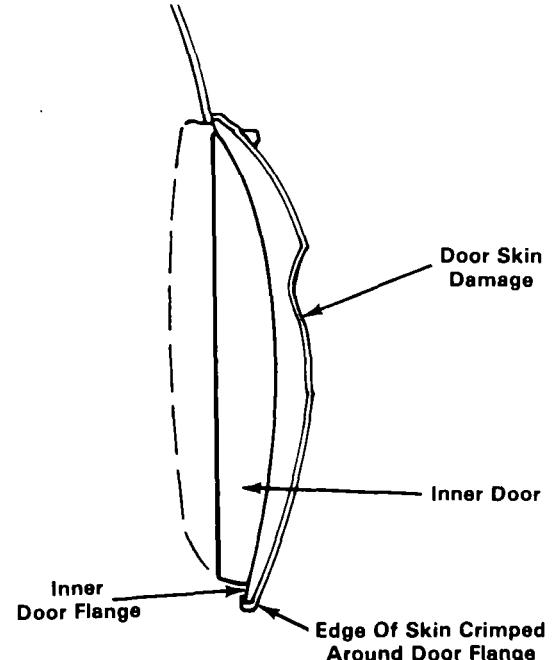


Figure 6-15. Cutaway Of Door Panel Damage

1. Remove exterior molding and hardware. It is not necessary to remove window regulator, remote control mechanisms, locks or runs.
2. Remove door assembly and place on flat surface with edges of door extending over edges of surface to provide room to work.

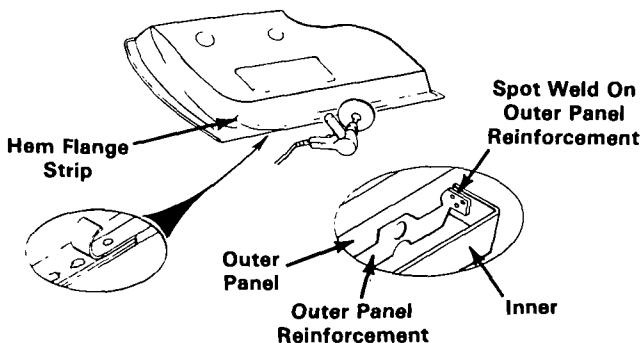


Figure 6-16. Hem Flange Removal

3. If door has an outer panel reinforcement, break the weld.
4. Grind off the hem flange and remove the old panel.
5. Repair any damage to the inner panel.
6. Position new outer panel over door and bend the end flange over the inner flange.
7. Spot weld outer panel reinforcement to new door panel.
8. Spot weld new hem flange to inner panel.
9. Metal finish exterior surface, paint and assemble interior trim and hardware.

6-10. PROCEDURES FOR WELDING FENDERS AND QUARTER PANELS

When a complete panel must be replaced it will be necessary to remove the bolts securing the panel to the

rest of the structure, or to cut through the spot welds if the panel is welded in place. In most cases a front fender will be bolted in place, while the other panels will be either spot welded or continuous seam welded. The alignment of front fenders is usually simple because the bolt holes are often elongated so that the position of the new front fender can be shifted and correctly aligned. Generally all other panels are welded into place.

If the whole panel is to be replaced, the old panel must be removed by cutting along the weld if welded by continuous seam, or by drilling out the spot welds if it is spot welded in place. Car and body manufacturers have the panels welded in different places, so it will be necessary to inspect the body to determine where the welds are located in each case. After the old panel is removed, the inner panels must be carefully checked, straightened or replaced.

The new outer panel can then be placed and held in position by vice-grips or c-clamp. When welding, start at the center and proceed first in one direction and then the other. In order to ensure reduced distortion due to heat, weld only a section of 2 or 3 inches (51 to 76 mm) at a time. It is important to constantly check the over all temperature of the sheet steel around the welding area, because it is in this concentrated heat area that warpage and distortion will begin. Leave a gap and then weld another short section. When the weld is completed it can be hammered down, filled with body putty and sanded.

6 - 11. WELDING FRAMES AND HIGH STRENGTH (HSS) STEELS - The new HSS steels are used on many of the new economy compact cars. HSS steels can be found in the steel gussets, brackets, floor pans and support members of these new models. HSS steels are thinner for weight reduction and are heat sensitive. As heat is applied, the strength decreases and cracking can occur, therefore the heat affected zone must be kept as small as possible. For this reason the MIG welding process has become the preferred method for welding HSS steels, and the oxacetylene welding or brazing processes, with its wider heat affective area, are normally not recommended.

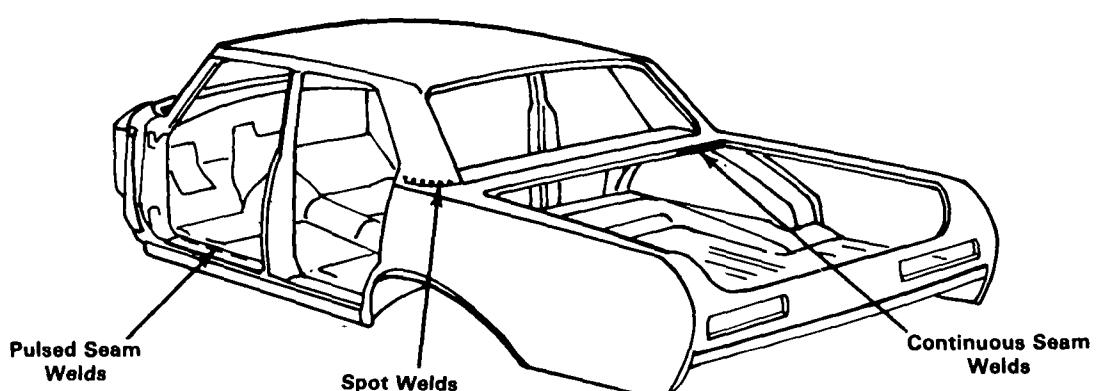


Figure 6-17. Automotive Body Sections Assembled With Continuous Seam, Pulsed And Spot Welds



Figure 6-18. Application Of Body Putty

6-12. PROCEDURES FOR WELDING THIN SHEET METAL

1. Use a .030 or .023 E70S-6 wire and argon/carbon dioxide shielding gas.
2. Use direct current electrode negative for reduced burn through.
3. Insert the gun Negative/Positive weld output selector plug into the NEGATIVE weld output receptacle and connect the work lead to the POSITIVE weld output receptacle.

IMPORTANT : For maximum penetration on thicker materials such as 18 gauge (1.22 mm) and thicker, reconnect for direct current electrode positive.

6-13. WELDING MILD STEELS - The following are some basic guidelines that can be used when using this welding power source to weld mild or high strength steels:

1. Use a power wire brush or sander to remove paint to bare metal in the area to be repaired. Two to three inches (51 to 76 mm) on either side of the weld area should be cleaned for applying body filler after welding is completed.
2. Remove damaged metal using hand cutters, shears or a power hand grinder equipped with a cutting wheel.

3. Fit a new piece of sheet steel over the section which was removed. The new material should overlap the cut away section by one inch.
4. Clamp the new metal in place and prepare to spot weld.
5. Place the THICKNESS/VOLTS selector plug into number 3 or 4 tap, the weld timer at 3 to 4, the burnback at 4 to 5 and the selector switch to the SPOT position.
6. Install the spot nozzle on the gun.
7. With the shielding gas and power source turned on, place the spot nozzle and press firmly against the new material about 1/2 to 3/4 inch (12 to 18 mm) from the edge. Fit up must be tight to assure good, repeatable spot welds.
8. Begin spot welding from the center out on each side. Distortion may occur if welding begins at the corners.
9. Space spot welds 1 to 1 1/2 inches (25 to 38 mm) apart around the repair. Spot welds should be about 3/16 inch (5 mm) in diameter.

IMPORTANT : Do not make continuous welds around the repair as this will promote distortion and warpage.

10. After welding, remove the clamp and grind spot flush to surface.
11. Smooth the joints with body filler and finish.

6-14. HOW TO PREVENT GLASS BREAKAGE AND SPATTER ON WINDOWS - Spatter and excessive heat can become problems when welding near windows. Protect the windows by keeping them covered and as far away from the heat zone as possible. When welding must be performed near windows, the windows should be covered and protected from excessive heat by using wet rags. A putty like substance which reduces heat transfer is available through your welding supplier. If burn through and spatter become problems, ensure that the correct voltage tap is being used for the size material being welded. Use an argon and CO₂ gas mixture and check travel speed.

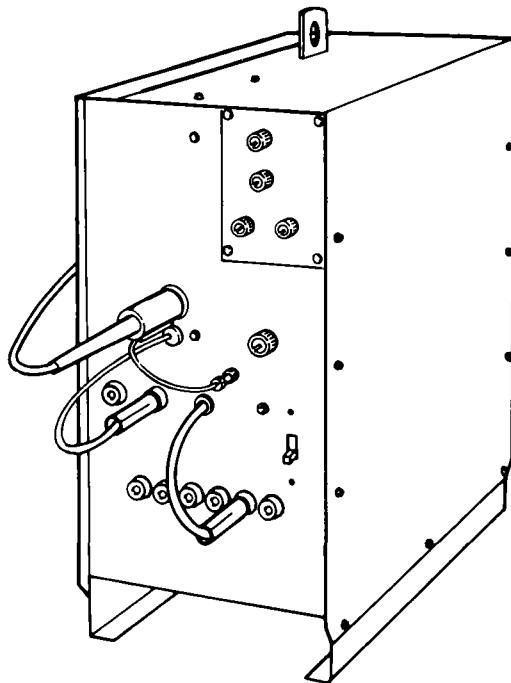
6-15. SHUTDOWN PROCEDURES

1. Place the welding power source POWER switch in the OFF position.
2. Close the gas cylinder valve.

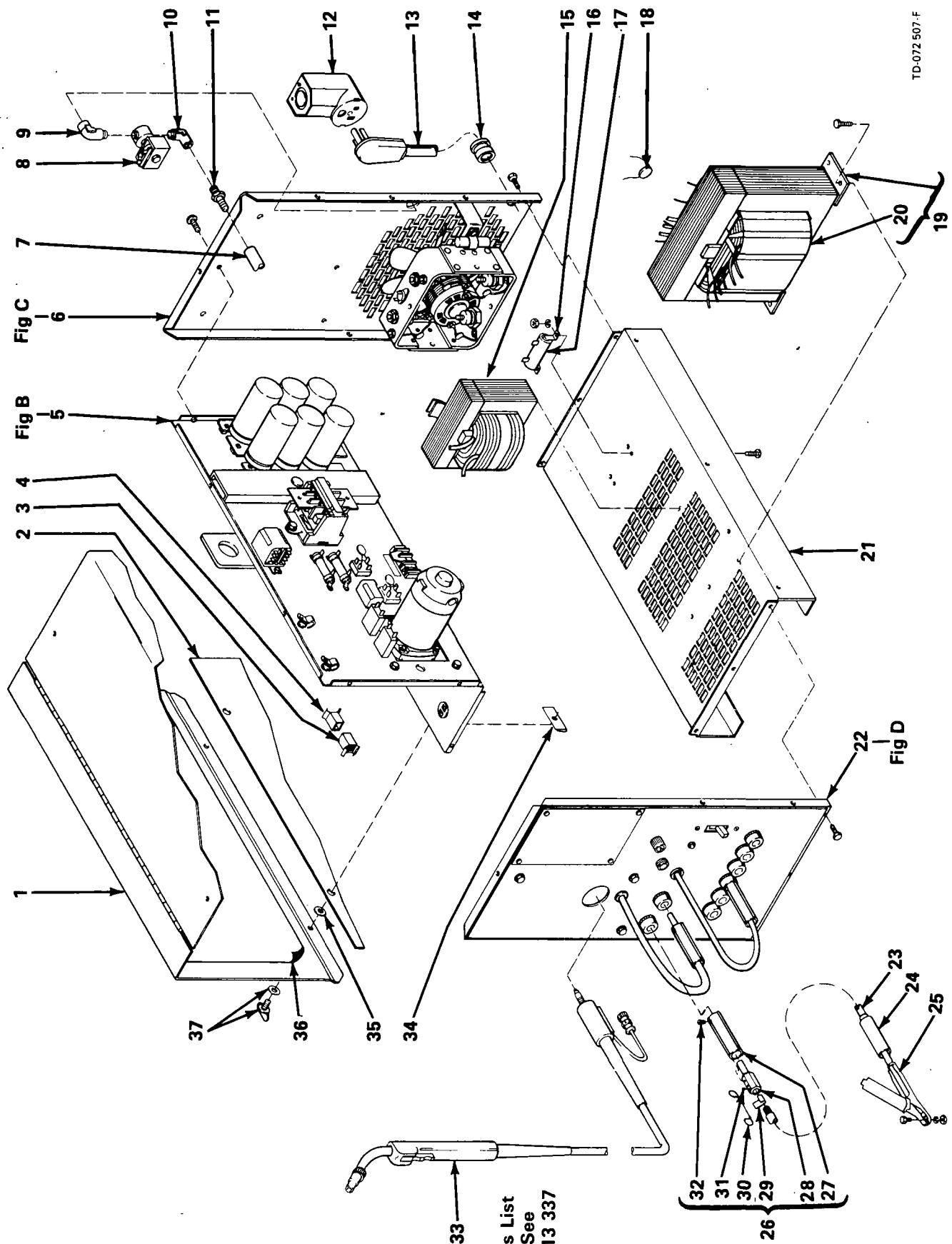
WARNING: HIGH CONCENTRATION OF SHIELDING GAS can harm health or kill.

- Shut off gas supply when not in use.

Effective With Serial No. JH159463



PARTS LIST



For Parts List
Of Gun See
Form: 113 337

Replace Coils at Factory or Factory Authorized Service Station

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure A		Main Assembly		
1		+007 778	WRAPPER	1
		047 497	LABEL, general precautionary	1
2		057 506	PANEL, side	1
3		008 040	CONNECTOR, jumper	1
4	PLG2	008 073	HOUSING RECEPTACLE & SOCKETS (consisting of)	1
		058 972	. TERMINAL, female	8
5		Figure B	BAFFLE, air-w/components (Pg 4)	1
6		Figure C	PANEL, rear-w/components (Pg 6)	1
7		604 550	HOSE, No. 1 x 3/16 ID (order by ft)	3 ft
		089 120	CLAMP, hose 3/16	1
8	GS1	035 630	VALVE, 24 volts ac/6 volts dc 2 way 1/4 IPS port 1/8 orifice	1
9		010 296	FITTING, hose-elbow M 1/4 NPT x 5/8-18 RH	1
10		010 678	FITTING, pipe-elbow street 1/4 NPT LH	1
11		073 433	FITTING, barbed male 3/16 TBG x 1/4 NPT	1
12		039 778	RECEPTACLE, straight 3 pole 50 amp 250 volts	1
13	PLG1	023 210	CABLE, power 10/3 9 ft 50 amp cap (230 volts and under)	1
13	PLG1	085 986	CORD SET, power 10/3 9 ft 600 volts (over 230 volts)	1
14		010 290	BUSHING, strain relief 1.09 x 1.03 hole	1
15	Z	083 912	STABILIZER	1
16		605 741	BRACKET, mounting-resistor	1
17	R2	079 781	RESISTOR, WW fixed 25 watt 50 ohm	1
18	TP2	092 239	THERMOSTAT, NO	1
19	T1	093 173	TRANSFORMER, power-main (208/230) (consisting of)	1
20		092 028	. COIL, pri/sec	1
21		083 175	SKID, base	2
22		Figure D	PANEL, front-w/components (Pg 8)	1
23		023 100	CABLE, interconnecting-ground	1
24		026 843	INSULATOR, vinyl	2
25		010 368	CLAMP, ground 100 amp	1
26		039 901	PLUG, jack-black (consisting of)	1
27		026 978	. INSULATOR, jack plug-black	1
28		101 219	. PLUG, jack	1
29		019 833	. STRIP, copper	1
30		010 521	. WIRE, tie	1
31		602 178	. SCREW, set 1/4-20 x 3/8	2
32		602 160	. SCREW, self-tapping 8-32 x 1/4	1
33		++	GUN	1
34		010 357	NUT, speed No. 2	2
35		010 855	RETAINER, screw No. 2	2
36		113 227	LABEL, instructions	1
37		605 217	FASTENER, screw-wing head No. 2	2
		041 288	No. 10B Running Gear (Fig F Pg 11)	1

+ When ordering a component originally displaying a precautionary label, the label should also be ordered.

+ + For Parts List of Gun See FORM: 113 337

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

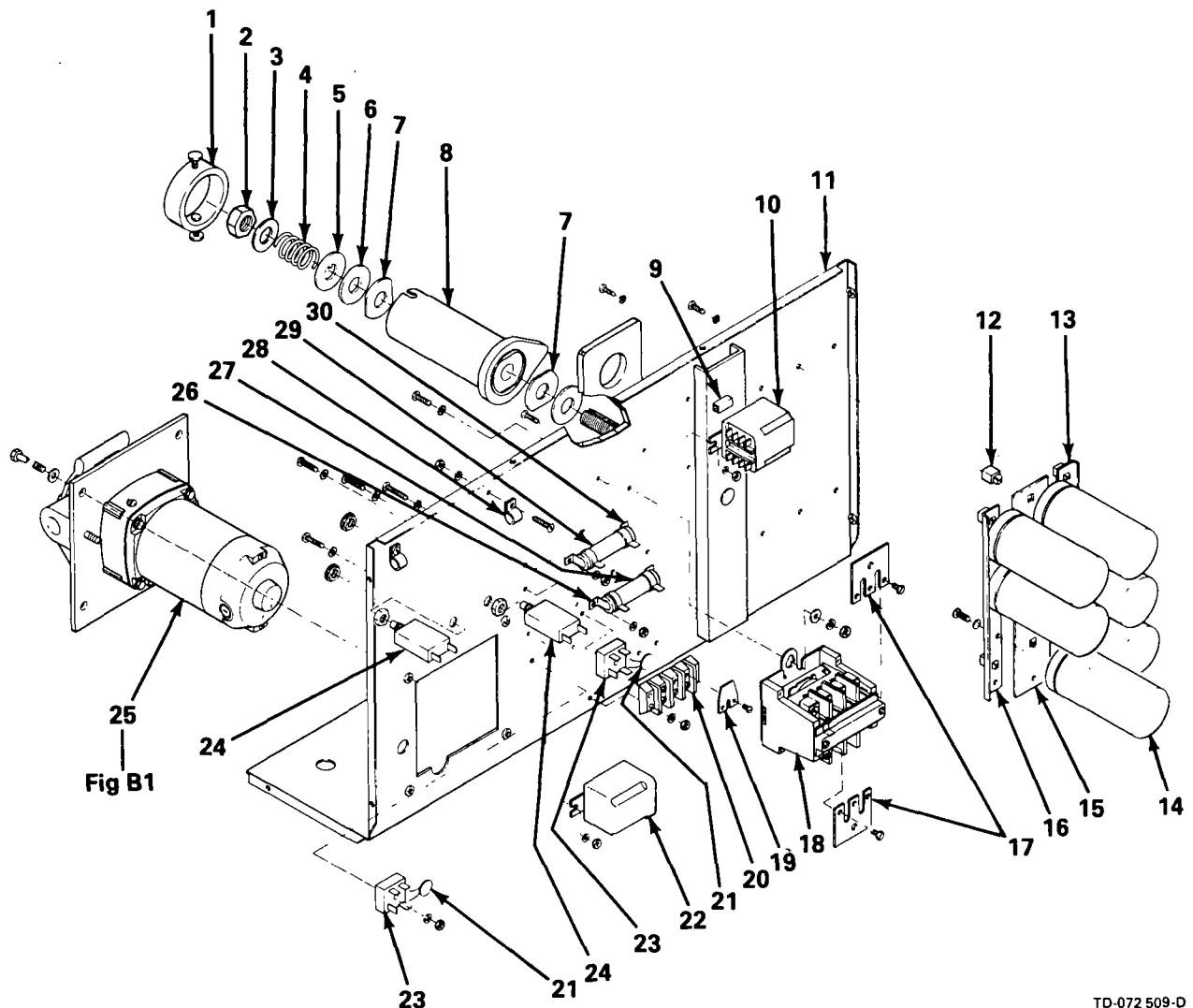


Figure B - Baffle, Air - W/Components

Item No.	Dia. Mkg.	Part No.	Description	Quantity
----------	-----------	----------	-------------	----------

Figure B

Baffle, Air - W/Components (Fig A Pg 2 Item 5)

1	058 427	RING, retaining-spool		1
2	085 980	NUT, hex-full 5/8-11		1
3	605 941	WASHER, flat-41/64 ID x 1 OD x 14 ga.		1
4	057 543	SPRING, compression		1
5	057 971	WASHER, flat-keyed 1-1/2 dia		1
6	010 191	WASHER, fiber 5/8 ID x 1-1/2 OD x 1/8		2
7	058 628	WASHER, steel-brake		2
8	058 428	HUB, spool		1
9	026 837	INSULATOR, terminal-nylon		1
10	CR1	072 817 RELAY, enclosed 24 volts ac DPDT flanged		1
11		044 995 BAFFLE, air		1
12		083 147 GROMMET, push in		6
13		082 907 ANGLE, mtg-RH capacitor		1
14	C6	031 728 CAPACITOR, electrolytic 20,000 uf 35 volts dc		6
15		082 902 STRIP, mtg-center capacitor		1
16		082 875 ANGLE, mtg-LH capacitor		1
17		057 511 LINK, connector-contactor		2
18	W	035 519 CONTACTOR, 40 amp 3 pole 24 volts (consisting of)		1
		024 493 . COIL, 24 volts		1
18	W	034 893 CONTACTOR, 40 amp 3 pole 24 volts (consisting of)		1
		024 493 . COIL, 24 volts		1
19		038 620 LINK, jumper		1
20	TE1	026 189 BLOCK, terminal 30 amp 3 pole		1
21	VR1,2	082 722 VARISTOR, 0.6 watt 175 volts dc		2
22	CR2	006 393 RELAY, enclosed 24 volts ac DPDT flanged		1
23	SR2,3	035 914 RECTIFIER, integrated 25 amp 400 volts		2
24	CB1,2	083 431 CIRCUIT BREAKER, manually reset 5 amp 250 volts		2
25		044 988 DRIVE ASSEMBLY, wire (Fig B1 Pg 5)		1
26		605 741 BRACKET, mtg-resistor		1
27	R3	059 642 RESISTOR, WW fixed 25 watt 10 ohm		1
28		010 014 CLAMP, 3/4 x 13/64 hole		2
29	R5	006 537 RESISTOR, WW fixed 12 watt 0.5 ohm		1
30		052 704 CLIP, spring-mtg resistor		2

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
----------	------------	----------	-------------	----------

Figure B1 044 988 Drive Assembly, Wire (Fig B Pg 4 Item 25)

1	605 854	RING, retainer	2
2	072 649	BEARING, flanged	1
3	112 909	GEAR, drive .030-.035 wire	2
	†112 907	GEAR, drive .024 (top gear)	1
4	605 287	KEY, 1/16 x 1/4	2
5	058 360	SHAFT	1
6	058 363	COVER	1
7	072 585	BEARING, flanged 5/16 x 7/16 x 3/8	1
8	010 918	PIN, spring 5/32 x 1-1/2	1
9	057 551	SPRING, pressure	1
10	056 081	LINER, monocoil	1
11	605 525	NUT, self-locking hex 5/16-24	1
12	010 929	WASHER, flat-spring 3/8	1
13	M 093 153	MOTOR, gear (consisting of)	1
14	*031 595	. BRUSH, w/spring	2
15	057 432	. SCREW, brush holder cap	2
16	079 624	SCREW, cap-hex hd 3/8-16 x 2-1/4	1
17	602 213	WASHER, lock-split 3/8	2
18	010 910	WASHER, flat-SAE 3/8	1
19	044 994	INSULATOR, motor	1
20	601 838	NUT, brass-hex jam 3/8-16	1
21	079 633	FITTING, hose-barbed nipple 3/16 TBG	1
22	044 954	HOUSING, drive-roll feeder	1
23	079 772	KNOB	1
24	058 359	PIN, pivot	1
25	604 741	PIN, cotter-hair 0.042 x 15/16	1

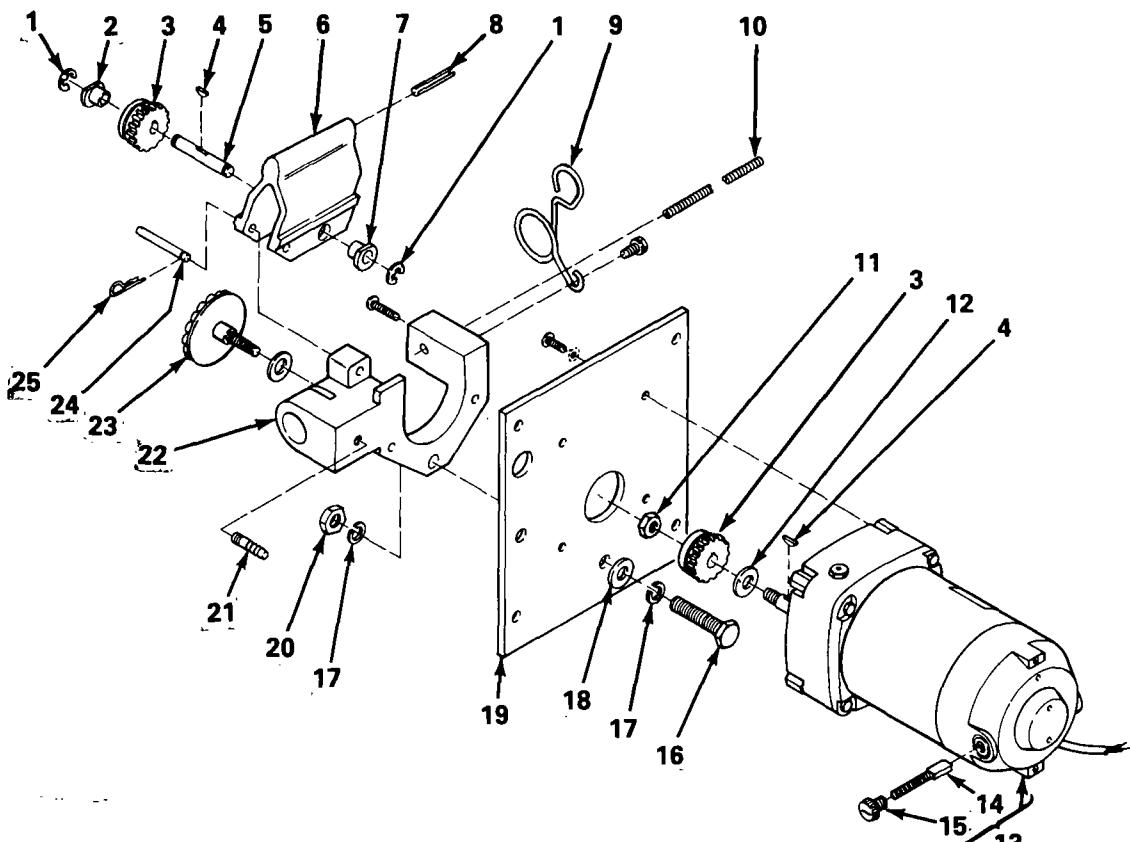


Figure B1 - Drive Assembly, Wire

TC-072 511

*Recommended Spare Parts.

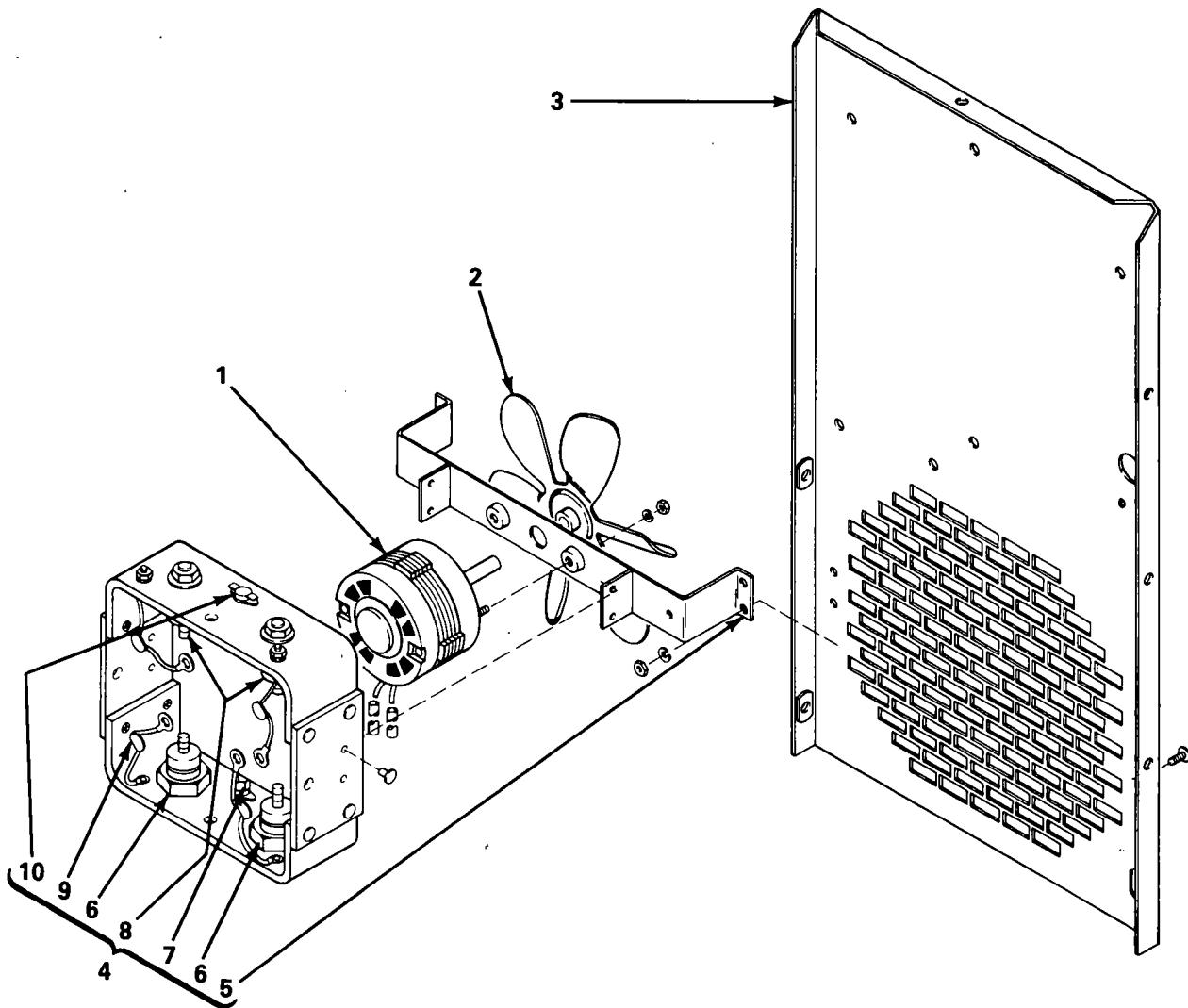
†Optional Parts

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
----------	------------	----------	-------------	----------

Figure C Panel, Rear-W/Components (Fig A Pg 2 Item 6)

1	FM	032 678	MOTOR, fan 230 volts ac	1
2		032 662	BLADE, fan 60 Hz 10 inch 6 wing	1
3		083 916	PANEL, rear	1
4	SR1	089 733	RECTIFIER, silicon diode (consisting of)	1
5		057 496	BRACKET, mtg-rectifier & fan motor	1
6		037 306	DIODE, 150 amp 300 volts RP	2
7	TP3	086 323	THERMOSTAT, NO	1
8		037 305	DIODE, 150 amp 300 volts SP	2
9	C1-4	031 689	CAPACITOR, ceramic 0.01 uf 500 volts dc	4
10	TP1	604 515	THERMOSTAT, NC	1



TD-072 508-B

Figure C - Panel, Rear-W/Components

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

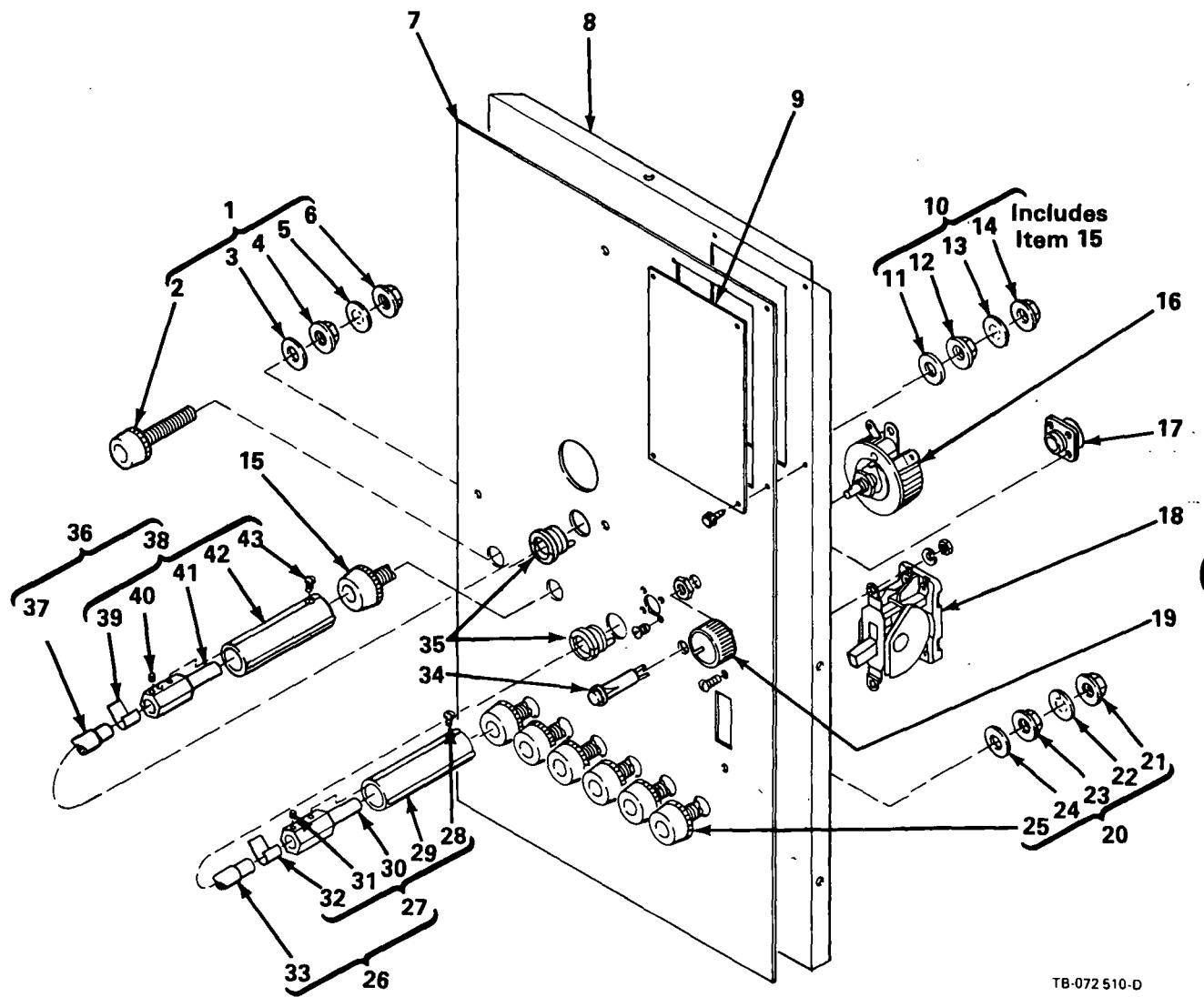


Figure D - Panel, Front-W/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure D		Panel, Front - W/Components (Fig A Pg 2 Item 22)		
1		039 801	RECEPTACLE ASSEMBLY, jack-black(consisting of)	1
2		091 542	. RECEPTACLE & NUT	1
3		010 291	. WASHER, flat-nylafil 5/8 ID x 1-1/4 OD x 1/8	1
4		604 668	. NUT, self-locking hex 1/2-20	1
5		605 787	. WASHER, lock-internal tooth 1/2	1
6		601 881	. NUT, hex-jam 1/2-20	1
7		+ 112 552	NAMEPLATE(order by model & serial number)	1
		004 948	LABEL, warning the hazard of contact	1
8		083 917	PANEL, front	1
9		087 274	COVER, open-module	1
10		039 800	RECEPTACLE ASSEMBLY, jack-red(consisting of)	1
		083 917	PANEL, front	1
9		113 472	COVER, open-module	1
10		039 800	RECEPTACLE ASSEMBLY, jack-red(consisting of)	1
11		010 291	. WASHER, flat-nylafil 5/8 ID x 1-1/4 OD x 1/8	1
12		604 668	. NUT, self-locking hex 1/2-20	2
13		605 787	. WASHER, lock-internal tooth 1/2	1
14		601 881	. NUT, hex-jam 1/2-20	1
15		091 541	. RECEPTACLE & NUT	1
16	R1	605 828	RHEOSTAT, WW 50 watt 1.5 ohm	1
17	RC1	048 282	RECEPTACLE W/ SOCKET (consisting of)	1
		079 534	. TERMINAL, female	4
18	S1	090 328	SWITCH, toggle 2PST 40 amp 600 volts ac	1
19		097 924	KNOB, pointer	1
20		057 608	RECEPTACLE ASSEMBLY, jack-yellow(consisting of)	6
21		601 881	. NUT, hex-jam 1/2-13	1
22		605 787	. WASHER, lock-internal tooth 1/2	1
23		604 668	. NUT, self-locking hex 1/2-20	2
24		010 291	. WASHER, flat-nylafil 5/8 ID x 1-1/4 OD x 1/8	1
25		072 334	. RECEPTACLE & NUT	1
26		023 084	CABLE & PLUG ASSEMBLY, jack (consisting of)	1
27		039 878	PLUG ASSEMBLY, jack-yellow (consisting of)	1
28		602 160	.. SCREW, self-tapping 8-32 x 1/4	1
29		026 975	.. INSULATOR, jack plug-yellow	1
30		101 219	.. PLUG	1
31		602 178	.. SCREW, set 1/4-20 x 3/8	2
32		019 833	.. STRIP, copper	1
33		023 083	. CABLE	1
34	PL1	048 573	LIGHT, indicator-red lens 28 volts	1
35		010 325	BUSHING, strain-relief	2
36		044 943	CABLE & PLUG ASSEMBLY, jack (consisting of)	1
37		600 318	. CABLE, weld-No. 3 (order by ft)	2 ft
38		039 608	PLUG ASSEMBLY, jack-red (consisting of)	1
39		019 833	.. STRIP, copper	1
40		602 178	.. SCREW, set 1/4-20 x 3/8	2
41		101 219	.. PLUG	1
42		602 814	.. INSULATOR, jack plug-red	1
43		602 160	.. SCREW, self-tapping 8-32 x 1/4	1

+ When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS

Item No.	Dia. Mkg.	Part No.	Description	Quantity
----------	-----------	----------	-------------	----------

Figure E SPW 1 Spot Panel

1	R50	028 769	POTENTIOMETER, carbon 1 turn 2 watt 750K ohm	1
2	R51	028 770	POTENTIOMETER, carbon 1 turn 2 watt 1 meg ohm	1
3	R52	028 768	POTENTIOMETER, carbon 1 turn 2 watt 350K ohm	1
2	R51	028 770	POTENTIOMETER, carbon 1 turn 2 watt 1 meg ohm	1
3	R52	028 768	POTENTIOMETER, carbon 1 turn 2 watt 350K ohm	1
4	S50	086 895	SWITCH, rotary 3 position	1
5		073 914	WASHER, centering 7/16 dia	2
6	R53	605 890	RESISTOR, WW fixed 15 watt 0.25 ohm	1
7		080 509	GROMMET, SCR No. 8/10	3
8	PLG51	072 669	HOUSING, terminal 9 position	1
9	PLG50	079 798	HOUSING, terminal 13 position	1
10	PC50	097 897	CIRCUIT CARD (Fig E1 Pg 10)	1
11	RC55	008 072	HOUSING PLUG & PINS (consisting of)	1
		058 971	TERMINAL, male	8
12		086 650	PANEL	1
13		113 471	NAMEPLATE (order by model & serial number)	1
14		097 922	KNOB, pointer	4
		112 770	NOZZLE, spot-outside corner	1
		112 772	NOZZLE, spot-inside corner	1
		112 768	NOZZLE, spot-flat	1

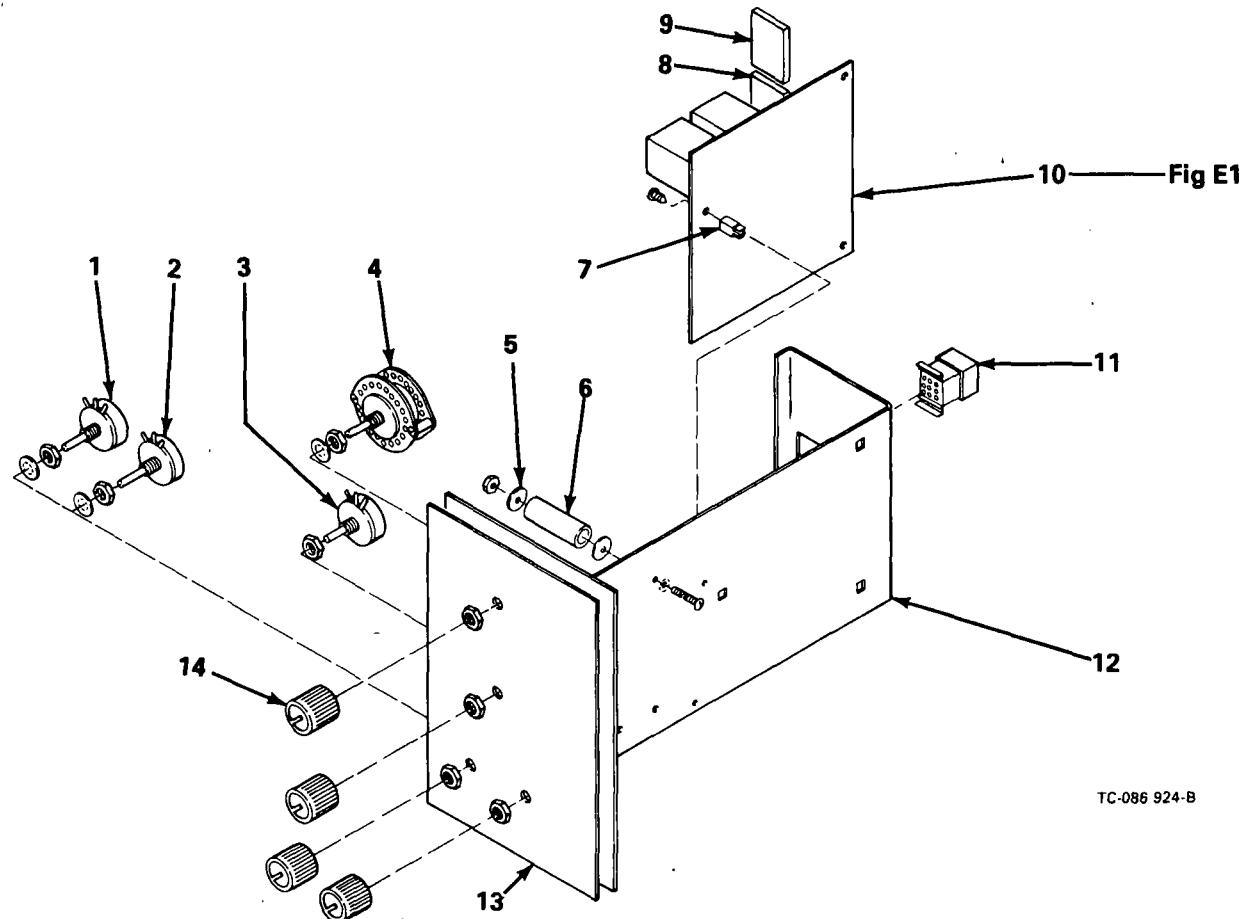
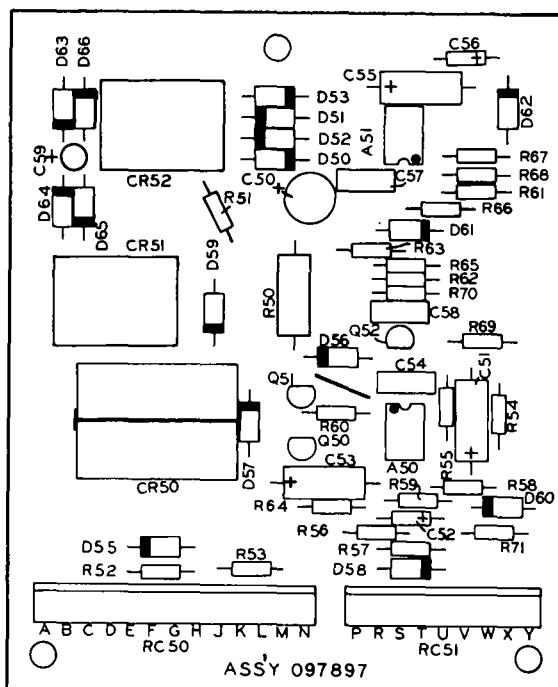


Figure E - SPW 1 Spot Panel (Optional)

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

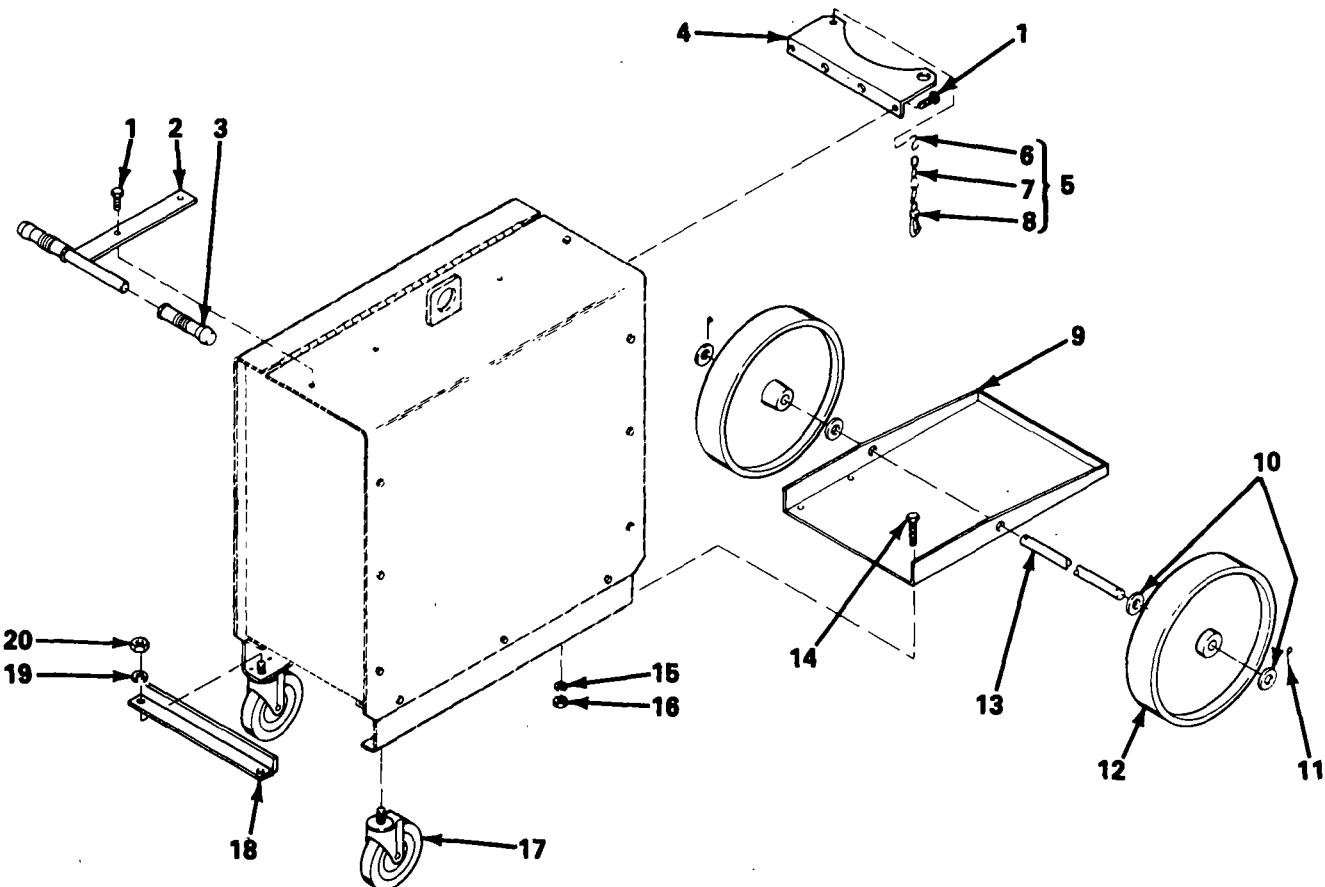
Dia. Mkgs.	Part No.	Description	Quantity
Figure E1		097 897 Circuit Card (Fig E Pg 9 Item 10)	
A50,51	009 159	1C, linear	2
C50	039 482	CAPACITOR, electrolyte 100 uf 35 volts dc	1
C51,53,55	032 820	CAPACITOR, tantalum 2.2 uf 35 volts dc	3
C52,56	073 714	CAPACITOR, tantalum 0.22 uf 35 volts	2
C54,57,58	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	3
C59	090 573	CAPACITOR, electrolyte 10 uf 50 volts	1
CR50	027 810	RELAY, enclosed 24 volts dc 4PDT	1
CR51	099 019	RELAY, enclosed 24 volts dc SPDT	1
CR52	099 018	RELAY, enclosed 24 volts dc SPDT	1
	079 844	SPRING, holddown-relay	1
	091 861	SOCKET, relay	1
D50-54,57-66	026 202	DIODE, 1 amp 400 volts SP	15
D56	037 449	DIODE, zener 15 volts 1 watt SP	1
Q50,51	037 200	TRANSISTOR, 200MA 40 volts NPN	2
Q52	073 535	TRANSISTOR, 100MA 30 volts NPN	1
R50	030 018	RESISTOR, carbon 1 watt 820 ohm	1
R51	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	1
R52,71	035 884	RESISTOR, carbon film 0.25 watt 100K ohm	2
R53,57,61,68,70	039 331	RESISTOR, carbon film 0.25 watt 4.7K ohm	5
R54,56,59,60,62, 66,67	035 827	RESISTOR, carbon film 0.25 watt 10K ohm	7
R55,58	035 886	RESISTOR, carbon film 0.25 watt 22K ohm	2
R63	039 333	RESISTOR, carbon film 0.25 watt 18K ohm	1
R64,69	039 327	RESISTOR, carbon film 0.25 watt 220 ohm	2
R65	035 887	RESISTOR, carbon film 0.25 watt 220 ohm	1
	092 648	RESISTOR, carbon film 0.25 watt zero ohm	1
RC50	079 795	TERMINAL, head 13 pin	1
RC51	072 670	TERMINAL, header 9 pin	1
PLG50	+ 079 798	HOUSING, terminal header 13 pin	1



Item No.	Part Mkgs.	Description	Quantity
----------	------------	-------------	----------

Figure F No. 10B Running Gear

1	601 954	SCREW, cap - hex hd 1/4-20 x 3/4.....	4
2	025 193	HANDLE, running gear	1
3	604 423	GRIP, handle	2
4	057 478	BRACKET, support - tank	1
5	022 617	CHAIN, cylinder rack	1
6	602 389	HOOK	1
7	602 387	CHAIN	1
8	602 384	SNAP	1
9	052 693	RACK, cylinder	1
10	602 250	WASHER, flat SAE 3/4 in	4
11	032 524	PIN, cotter 3/16 x 1-1/2	2
12	070 799	WHEEL, rubber, 3/4 bore 10 x 2-3/4	2
13	052 692	AXLE, running gear	1
14	601 944	SCREW, cap-hex hd 5/16-18 x 3/4	4
15	602 211	WASHER, lock-split 5/16	4
16	601 869	NUT, hex-jam 5/16-18	4
17	008 999	CASTER, swivel 4 inch dia	2
18	052 691	BAR, spreader cylinder rack	1
19	602 213	WASHER, lock-split 3/8	2
20	601 871	NUT, hex jam 3/8-16	2



TC-049 808-B

Figure F - No. 10B Running Gear

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.